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ABSTRACT

The ABC's of Construction project was a demonstration project designed to integrate basic skills training with an industry-developed vocational-craft training program. The program was located at the central training facility of the Pelican Chapter of Associated Builders and Contractors (ABC), an organization made up of nearly 300 member companies involved in construction in southern Louisiana. During the project's 20-month grant period (March 1991-October 1992), 649 workers were screened on the reading and mathematics sections of the Test of Adult Basic Education, and 204 of them were identified to receive educational counseling comparing their reading and mathematics skills to individual training tasks identified through a literacy task analysis of their apprentice program. During three 5-month cycles, 107 workers each received 10 to 268 hours of instruction in an open-entry/open-exit classroom program. Trainee attendance averaged 44.63 hours. A total of 359 students slots were filled during the project's 7 seminars in workplace dynamics. Contact hours throughout the project totaled 2,945 hours, and the retention rate was more than 80%. Pre/postcompetency tests established that, after 50 hours of instruction, trainees' skill levels increased an average of 2.8 years in mathematics and 2.02 grades in reading. (Appendixes constituting approximately 75 percent of this document contain the following: external evaluation report, original grant abstract, classroom environment inventory, literacy task analysis, and overview of the project curriculum and original materials.) (MN)

ED 374 281

ABC's OF CONSTRUCTION

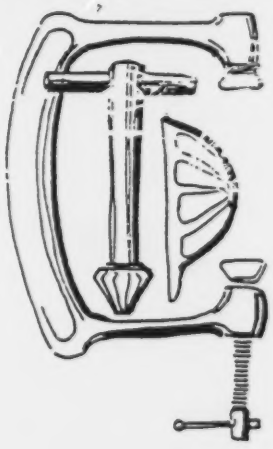
East Baton Rouge Parish School Board

in partnership with

The Greater Baton Rouge Chamber of Commerce

on the site of

The Pelican Chapter
Associated Builders and Contractors



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FINAL REPORT

January, 1993

Funded by the U.S. Department of Education
National Workplace Literacy Program
FY 1991
PR #V198A10155

CE067219

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ABC'S OF CONSTRUCTION

Final Report

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- External Evaluation Report
- Original Grant Abstract
- Classroom Environment Inventory
- Literacy Task Analysis
- Overview of Curriculum and Original Materials

PREFACE

As a demonstration project funded through the National Workplace Literacy Program, the *ABC's of Construction* project provides a model that integrates basic skills with a private, industry-developed, vocational craft-training program. The dynamics of the project have been multi-tiered, involving far more than partners and employees.

The old economic formula in the South of cheap labor and cheap land no longer applies. In 1988, Jim Wooten wrote a column in The Atlanta Constitution in which he stated, "The moral is this: communities save themselves by developing the chemistry that supports and encourages each other." And this has been the secret to the successes of the *ABC's of Construction* Project. The "interconnectedness of effort"--the chemical plants, the contractors, public educators, and the workers--demonstrate a rare commitment to the development of human resources in Louisiana. We have learned to encourage and inspire each other.

The project became a permanent component of the training program because of the team approach to planning, implementation, and management in which the project and its learners are viewed as being the top priority. Outstanding efforts on the part of curriculum writers, Drs. Atkinson, Longman, and Maxcy, resulted in hundreds of original exercises and the evolution of a successful model.

I would like to express special appreciation to Lee Jenkins, Director of Education at ABC, and to Dr. George Varino, Director of Adult and Continuing Education for EBR schools, for their humor, patience and confidence. Also, Sarah Newcomb with the U.S. Department of Education and Jorie Philippi, who served as external evaluator, offered support, guidance, and encouragement on a regular basis.

The teaching staff proved adaptable and enthusiastic, even as procedures were constantly reinvented and Saturday staff development sessions became numerous. Perhaps most noteworthy, however, is the commitment and dogged pursuit of learning demonstrated by our workers, all of whom put in a hard day's work before we saw them and many of whom had a long drive home in the dark after they left us. Louisiana workers in industrial construction must prove themselves both mentally and physically everyday, and the largest share of gratitude and grace belongs to them.

Pamela D. Wall, Project Manager
ABC's of Construction

PROJECT OVERVIEW

ABC's of Construction

The Adult and Continuing Education Department of East Baton Rouge Parish Schools and The Greater Baton Rouge Chamber of Commerce applied for a U.S. Department of Education workplace literacy grant in the fall of 1990 to operate a basic skills program for industrial construction workers employed in petrochemical plants between Baton Rouge and New Orleans. A grant award letter was received in March 1991 and a project manager hired in May. A total of $202,654 in federal funds was awarded, with a match of $62,624 from the partnership and site participants. The program is located at the central training facility of the Pelican Chapter of Associated Builders and Contractors, an organization made up of nearly 300 member companies involved in construction in southern Louisiana. The Pelican Chapter of ABC, headquartered in Baton Rouge, implements an industry-specific, privately funded training program that provides training to over 3000 petrochemical workers a year.

The factor that separates this demonstration model from other workplace literacy projects funded by the U.S. Department of Education is its integration of basic skills with a permanent, private vocational craft training program. Program developers were faced with the preparation of workers who had to be successful in a classroom program somewhat similar to a traditional school setting. Whereas reading in school is "reading to learn," and the work environment usually demands "reading to do" tasks, our curriculum had to focus on **"reading to learn to do."**

A major thrust of the project was to support apprenticeship trainees in the four-year Entry Level Mechanic coursework in Millwright, Welding, Pipefitting, and Electrical and Instrumentation trades. Before federal funding, the ABC instructional staff and curriculum focused on craft training with little auxiliary academic or educational support for those worker/students who lacked the reading and math skills to succeed in training

A comprehensive literacy task analysis of the training program and the resulting competency-based curriculum, including original, contextual instructional materials in reading and math, have been a vital addition to the training program. Although maintained as a voluntary program and under-utilized by workers, the ABC's of Construction project has been deemed a success by all partners.

I. PROJECT SUMMARY

The project was conducted during a 20-month grant period, from March 1, 1991, to October 31, 1992, which included a 2-month no-cost extension. The Technical Development Center (TDC) opened its doors on August 1, 1992, at the ABC Training Center. The 1992 grant project became progressively more integrated into the design of the training program and is now viewed as a permanent part of the training curriculum.

During the grant period, 649 workers who registered for entry-level training classes were screened on the reading and math sections of the TABE (Test of Adult Basic Education) with

average grade level scores of 10.4 in reading and 9.7 in math. Of entry trainees screened, 204 were identified to receive some amount of educational counseling which compared the individual's reading and math skills to individual training tasks as revealed in a comprehensive literacy task analysis of the apprentice program.

In three five-month cycles, 107 workers attended the voluntary, open-entry/open-exit, individual classroom program for ten to 268 hours, a total of 2945 contact hours, with a retention rate of over 80 percent. The average attendance was 44.63 hours, with a median hours-of-attendance at 29.13 hours. In addition, a total of 359 student slots were filled during seven seminars in workplace dynamics that were held for entry-level apprentices during the training semester as part of the TDC curriculum.

II. MAJOR PROJECT OUTCOMES

* "institutionalization" is assured, with permanent facilities for the Technical Development Center being added to a new $750,000 expansion to the ABC Training Center

* the creation of 25 original, craft-specific instructional modules based on a comprehensive task analysis

* utilization of the educational staff of the Technical Development Center for math instruction and staff development of craft instructors within the training program in efforts to increase the overall quality of adult education and training at ABC

* the development of individual learning plans (ILP) for each worker registered in the Technical Development Center

* the replication of the program by ABC as part of the training program located in Lake Charles, Louisiana

* average worker improvements on pre/post-competency tests from 60 percent (average pre-test score) to over 80 percent (average post-test score); average grade-level gains on the TABE after 50 hours of instruction of 2.8 years in math and 2.02 grades in reading

III. CURRICULUM

A curriculum based on a survey of literacy tasks needed for success in the 8-semester apprenticeship program in millwright, E & I, pipefitting and welding has been developed for an open-entry/open-exit, individualized educational program. Following screening on the TABE, workers with potential "competency gaps" were counseled and encouraged to continue the assessment process. If the worker agreed, a competency-based math or reading pre-test was given and each worker participated in the development of his/her individual learning plan.

Curriculum strands have been designed in the following areas: Level III Reading (those below 6th grade level in reading); GED; Entry-Level Mechanic (ELM) preparation (basic skills for electrician, pipefitting, and millwright apprentice students); Test Preparation (for those who wish to take certification or other employment tests for promotion or job-retention); Calculator Skills; and Enrichment (for those who wish to brush up on skills for the job or skills upgrade.)

Unlike some other U.S. Department of Education workplace literacy projects, curriculum for the *ABC's of Construction* has been developed and modified for the TDC throughout the funding period. A computer programmer, under contract to produce original job-specific software, did not deliver products and had to be replaced in the last few months of the grant period. Nonetheless, three software programs have been created for trainees in the program:

1. Voltage, Current and Resistance: Solving Formula Problems
2. Geometry for Construction Workers
3. Equivalent Fractions and Decimals at Work

Three curriculum specialists have worked throughout the grant to produce the following modules of original, training- and job-correlated materials:

1. Reading Safety Signs
2. Reading Safety Words (modules 1-5)
3. Reading Hazardous Materials Labels (modules 1-3)
4. Words in Context for Millwrights
5. Words in Context for Electricians
6. Words in Context for Pipefitters
7. Locating Main Ideas, Millwrights
8. Locating Main Ideas, Electricians
9. Locating Main Ideas, Pipefitting
10. Reading Charts and Tables, an Introduction
11. Reading Charts and Tables for Pipefitting
12. Reading Charts and Tables for Millwrights
13. Reading Charts and Tables for E & I
14. Reading Diagrams for Electricians
15. Reading Diagrams for Pipefitters
16. Reading Diagrams for Millwrights
17. Solving Problems with Charts and Tables, Millwrights
18. Solving Problems with Charts and Tables, Pipefitters
19. Solving Problems with Charts and Tables, Electrical
20. Measuring in Construction, I
21. Measuring in Construction, II
22. Fractions for Pipefitters

Other, commercially available materials--especially in applied math--have been purchased and integrated within the curriculum. The curriculum strand for GED students also includes some original, job-specific instruction. During the last quarter of the funding period, a

comprehensive computer package teaching reading, math, and writing skills (CSR's Integrated Learning System) was purchased to assist in instruction. The 500 modules of instruction offered in the ILS program were "cross-walked" with the literacy task analysis to match necessary craft competencies with purchased computer assisted instruction.

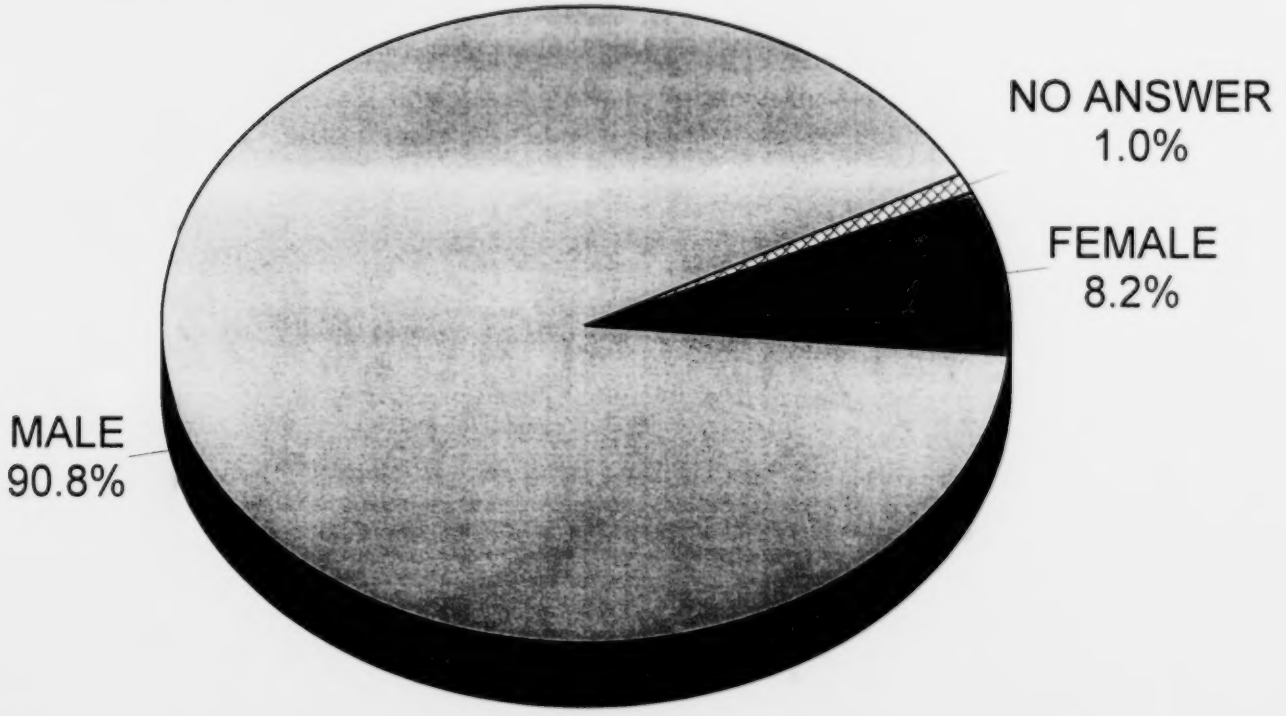
Also, use of tutors alone with the low-level readers was not always satisfactory, and the "Texas Scottish Rite Hospital Literacy Program" was purchased in the last quarter of the grant period in order to offer basic literacy instruction on video-tape with teacher support so that workers could participate at any time of the day.

IV. CHARACTERISTICS OF PROGRAM PARTICIPANTS

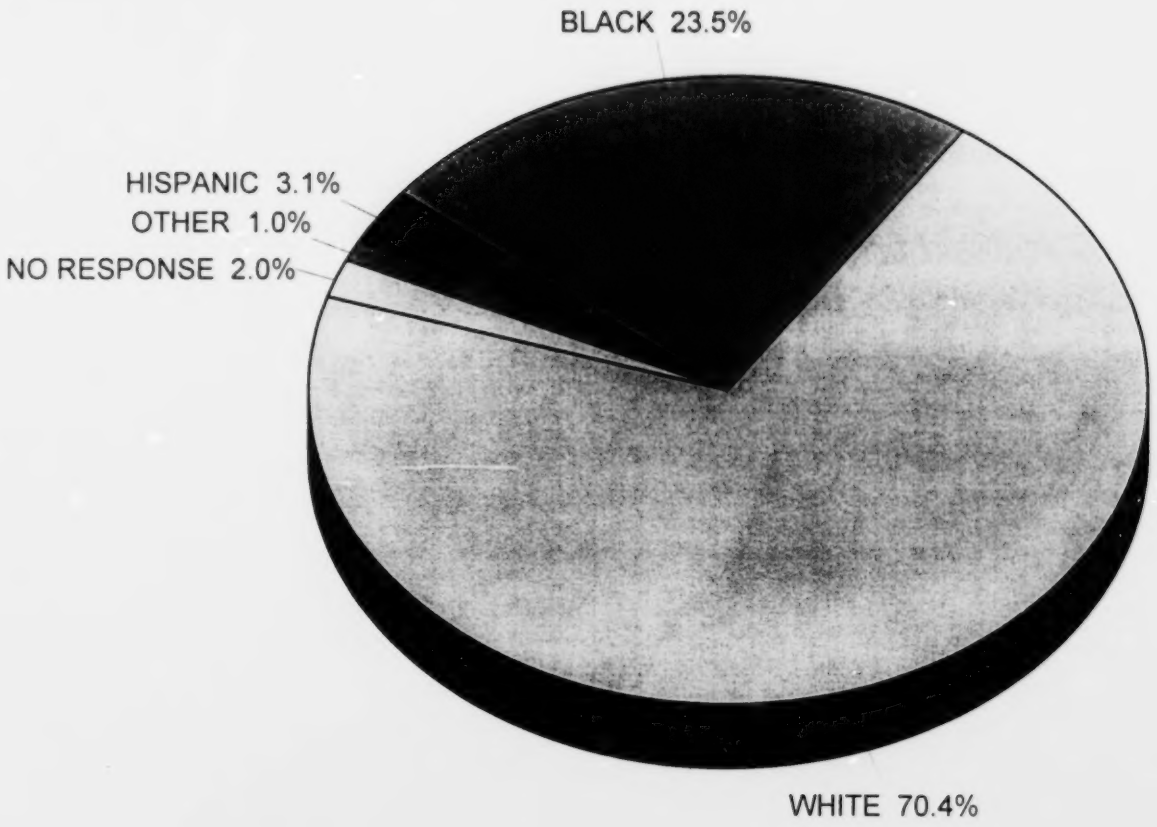
Workers who enrolled in the Technical Development Center were predominately white (70%) males (91%) in their 20's (44%) from small, rural Louisiana parishes (counties). Even though most of the workplace literacy curriculum focused on pre-algebra math skills and materials with readabilities below 10th grade level, 49% of participants already had obtained a GED, high-school diploma, or some post-secondary education. Over 55% of our students had been working in construction trades three or more years, usually in low-skilled jobs, with a salary of $ 7.01 to $9.00 per hour being the most frequently identified range on TDC in-take forms. (See next pages for complete student profile data.)

Because most workers who come to the ABC Training Center were identified by company owners or supervisors as potential craftsmen, average basic reading and math skill levels were, overall, adequate. The workers with very obvious skills gaps often do not even find out about the training center, a fact that needs to be addressed in the second round of funding.

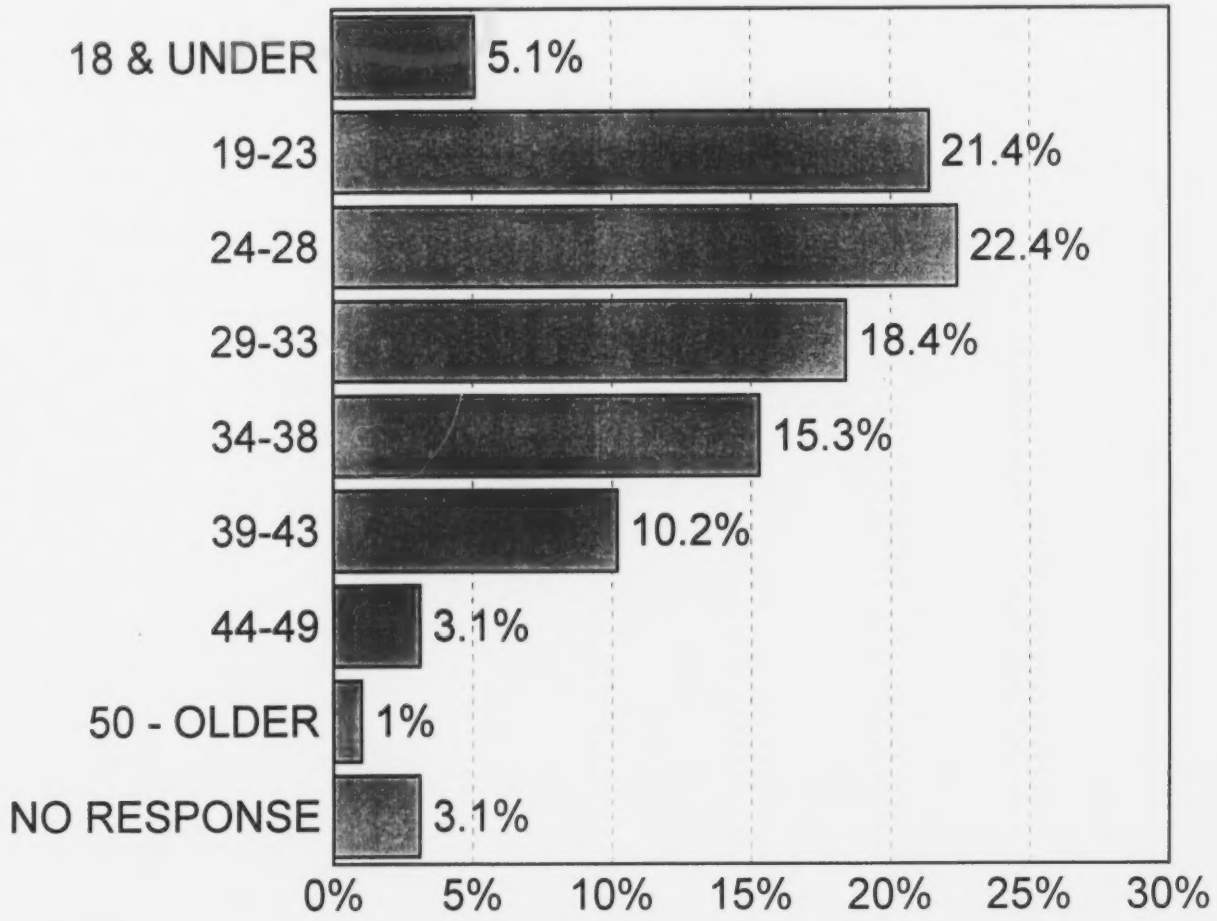
PROGRAM PARTICIPANTS BY GENDER



PROGRAM PARTICIPANTS BY RACE

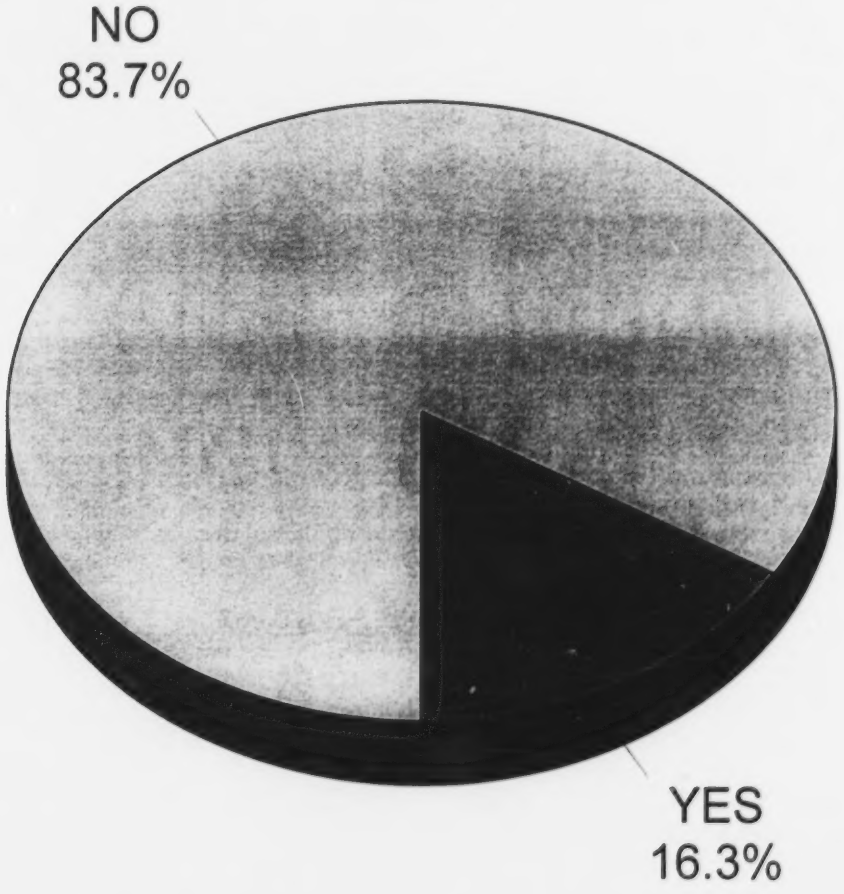


PROGRAM PARTICIPANTS BY AGE

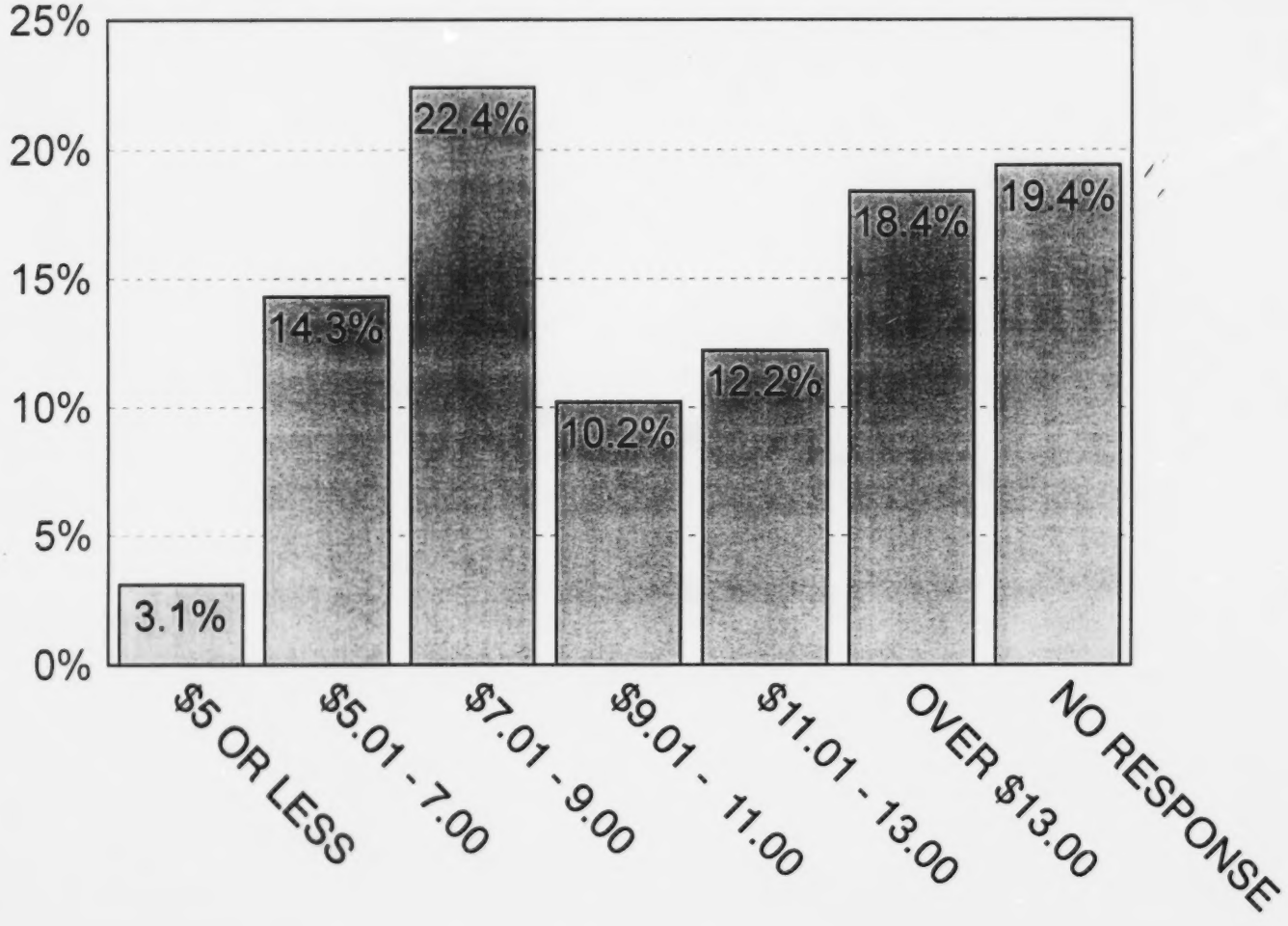


PROGRAM PATICIPANTS

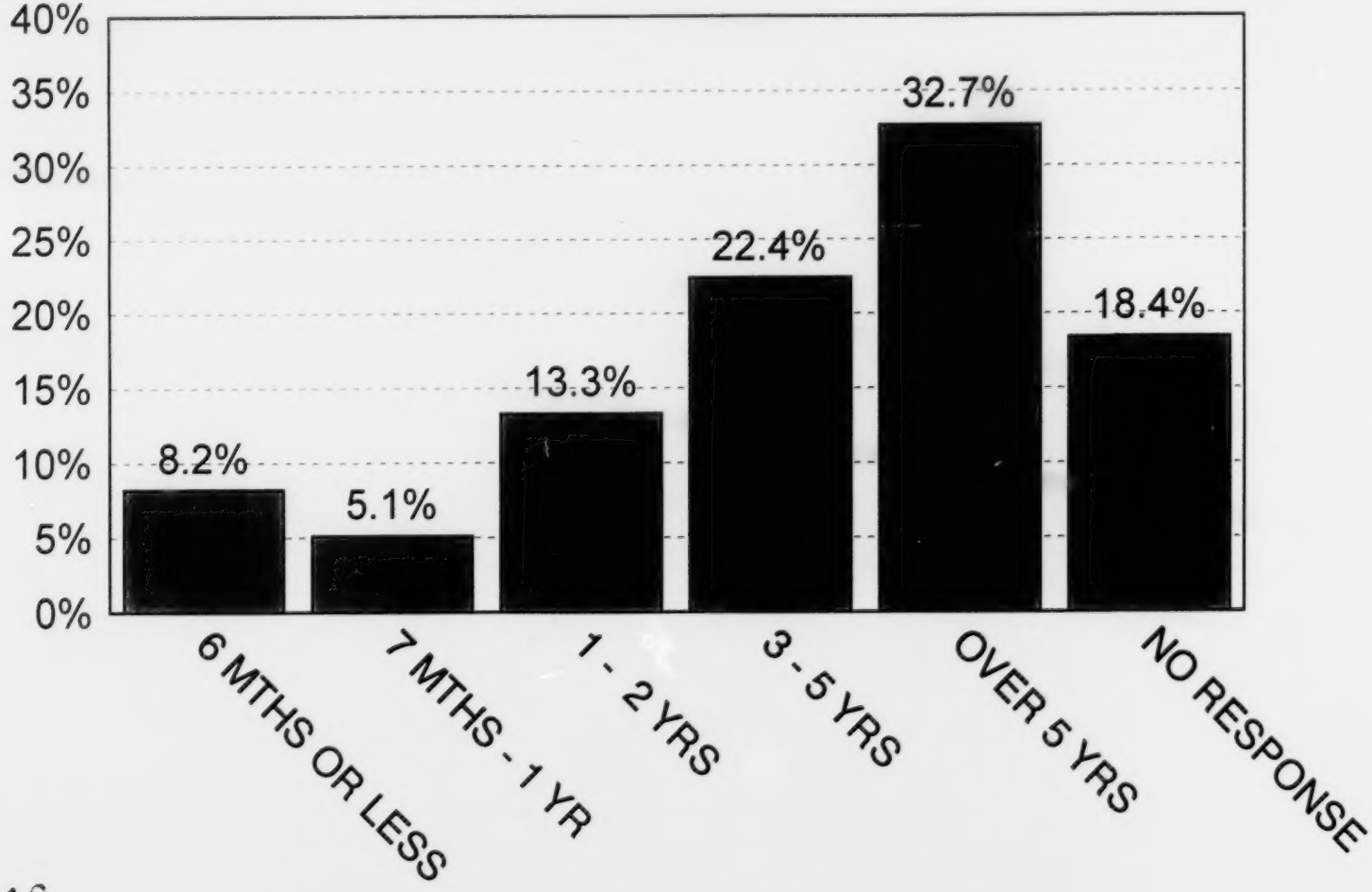
SINGLE PARENTS



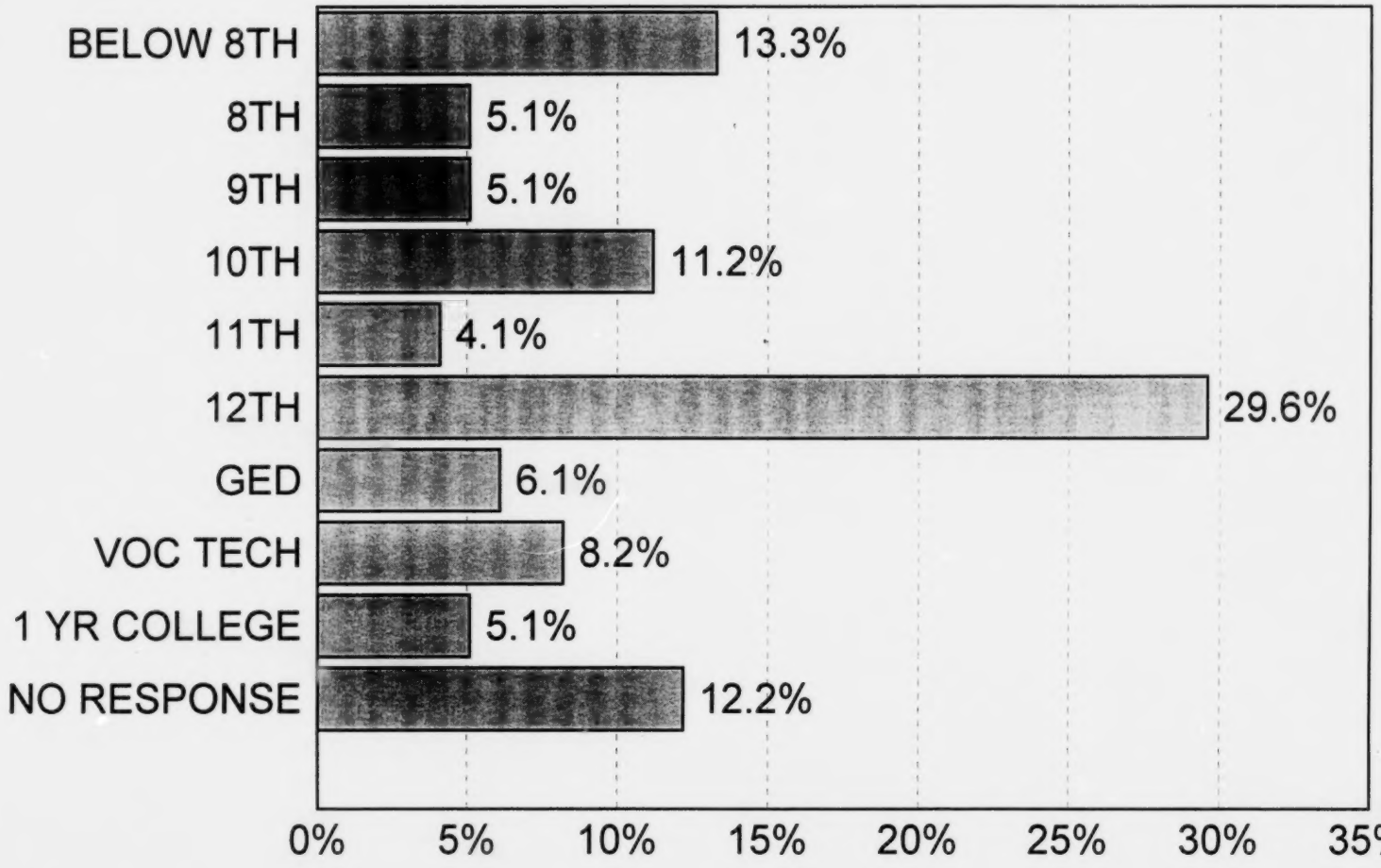
PROGRAM PARTICIPANTS
WAGE SCALE



PROGRAM PARTICIPANTS YEARS IN CONSTRUCTION



PROGRAM PARTICIPANTS
GRADE COMPLETED



V. OBJECTIVES, DOCUMENTATION, AND OUTCOMES

GOAL: To upgrade basic skills of construction workers attending a merit shop training program in conjunction with their employment with an affiliate of Associated Builders and Contractors in order to increase job security, productivity, and potential for career advancement.

OBJECTIVE/TASK

To provide a Technical Development Lab that has an accessible, non-intimidating and positive atmosphere.

Documentation

1. Enrollment and attendance data for three cycles, each five months long, for the 15 months of operation.

Outcome:

One-hundred-seven workers voluntarily attended 10 or more hours of instruction. Retention, although difficult to measure in an open-entry/open-exit, on-going program, was 80% among this group. The 10-hour standard was used because that was the average time required for a worker to take the TABE and the math or reading competency test, review test results with staff, set individual goals, complete registration forms, and begin a team-directed individual learning plan.

2. Exit questionnaire.

Outcome:

Over 70% of workers surveyed described the TDC as useful on the job and relevant. Ninety-four percent of participants interviewed considered time in the TDC an excellent use of their time. In the second funding period, interviews by a third party will be utilized to insure greater anonymity of respondents. Collecting exit data proved difficult because many workers whose goals were met (success in training became evident) would just stop coming for a while. Since our students are employed by many companies within a number of facilities, it was almost impossible to go "chase them down" on the job.

3. Interviews with students by Planning Team using Classroom Environment Inventory interview protocol. (See Attachments for form)

Outcome:

The greatest negative recorded was the noise level. Since the room that houses the TDC was originally built to house a craft lab, there was no carpet or noise insulation. The new building will address these needs.

4. Clearly written statement of program's standard operating procedures from staff manual, available in Project Manager's office.

Outcome:

Adherence to the guidelines developed and outlined in the staff manual contributed to greater efficiency in operation and clarity of procedures when dealing with student in-take, testing, etc.

5. Personnel histories

Outcome:

Teachers were part-time instructors, all with a minimum of a Master's Degree. None had taught in an official adult education program before, so none had formed habits that had to be "unformed." Two had taught elementary/middle school and one was a vocational education major.

A paid peer/tutor (a third-year apprentice) was often present in the classroom to assist in adapting instruction to field applications.

Planning Team members had advanced degrees in curriculum, reading, elementary education, college administration, special education, and other fields which contributed to quality and diversity in expertise.

The project director (Project Manager) was the only full-time employee of the project. Although she had no previous experience in workforce literacy projects, she had administered an adult literacy program for two years and had taught middle school. She coordinated all activities and eventually moved her office to the ABC training program in order to deliver services more effectively to the private entities involved.

6. At least forty-eight hours of in-service and staff training on the following subjects: workplace literacy, operating procedures, evaluation procedures, teaching strategies, modeling and direct instruction techniques, curriculum and original materials, trade applications, trouble-shooting, etc.

Outcome:

All teaching staff--professionals, paraprofessionals, and peer/tutor--attended nearly every session. These meetings also provided the opportunities for the teaching staff and the planning team to dialogue and participate in formative evaluation.

7. Copy of requisitions for gas and travel reimbursement to all participants who have attended classes over 50 hours.

Outcome:

Most workers have extended driving time for both work and training. While few participants had children who demanded child-care, travel reimbursements were seen as a major support for participation.

8. Facility--700 square-foot space with nine carrels and a partitioned space for testing and record-keeping--was located within the Training Center where workers came for craft training after work. Other rooms were offered by ABC, but staff members had to "split up" to utilize additional space when testing or working in groups.

Outcome:

Deficiencies (no separate testing room, no office space for director, and so forth) not corrected this funding cycle--new building scheduled for completion after April 30, 1993, will provide for such spaces--on file at Hays Town, Architect, Baton Rouge, La.

9. Teacher observations by Project Manager

Outcome:

All teachers needed continued encouragement to use original materials, which are more open-ended and difficult to assess than commercial materials. Also, more directed instruction and modeling of successful strategies to problem-solving needs to occur.

10. Instruction is entirely individualized--see student work folders in TDC and student portfolios.

11. Group instruction in soft skills every other month

Outcome:

Seven sessions have been held, two hours each, with 359 in total attendance. These sessions have been very successful, with attendance often limited by the physical space of the scheduled room. Although 14 one-hour sessions were scheduled in the original grant application, that number was considered to be too disruptive of the training program. Seven sessions were scheduled for two hours each in order to allow more group discussion, questions, and follow-up on each topic. In the next cycle, seminars will be video-taped so workers who missed them might view them later. Also, a series of workplace dynamics workshops will be held this summer as a separate course of study when the regular training session is closed.

OBJECTIVE/TASK

To offer a basic skills program in which success is measured by competency-based tests. 75% of workers who complete assigned ILP will achieve 80% mastery on post-test of competencies.

Documentation

1. Reading and math competency tests

Outcome:

Reading competency tests were developed and revised but have not been fully utilized for placement or to evaluate progress. Most workers are more interested in improving math skills than improving their reading. This was the greatest inaccuracy in our literacy task analysis--although reading skills appear to be necessary for success with the training materials, instructors often lecture and explain the content in such a way that reading competencies are less important.

Pre- and post-tests with the Piney Mountain math program were used for math placement and estimation of progress. Test items were all congruent with competencies identified in the literacy task analysis. The test offered a sophistication--scales, dials, diagrams, etc. on computer--that would have been time-consuming to duplicate just for the exercise of having something "original." The average post-test score is above 80%. Many workers have not completed their learning plans at the end of this cycle. Many are still working toward mastery of the skills measured in the competency tests.

A second level of math competency tests has been created for pipefitting and electrical curricula, which require higher math skills than other courses. (See Literacy Task Analysis in Attachments.)

GED students experienced two years growth on the TABE after 50 hours of instruction in either reading, language, or math. Only one worker completed requirements for the GED, as students must score twelfth grade in reading, math, and language in order to qualify in Louisiana. Most of the workers who have continued to come to the TDC for over 6 months duration are working toward a GED, which is encouraged by the ABC Training Center staff.

OBJECTIVE/TASK

To "track" promotions, productivity, and safety gains of workers in the program, short-term and long-term

Documentation

1. Samples of anecdotal records and letters

Outcome:

We have recorded a number of examples which indicate useful transfer and application of learning. The highest scoring student in the E & I 100 class one semester had attended the TDC for 6 months before enrolling in a training class. Another pipefitting student who was failing

in Pipefitting 100 withdrew and spent a semester in the TDC. With the same curriculum and same teacher next semster, he re-entered and passed the course. Two millwright students were able to stay in the apprentice program while learning math in the TDC; before the establishment of the federal basic skills program, they would have been forced to drop out. Another worker's salary went from five to eleven dollars an hour when the local television and newspapers did stories on his dedication to learning.

All TDC students thus far have passed the written 8-hour OSHA safety test that is required for the first time this year by the local area plants. All petro-chemical workers who do not pass this test by July 1, 1993, will no longer be allowed to enter the plants.

OBJECTIVE/TASK

To increase retention of trainees who enroll in the project

Documentation

1. Survey of training program records

Outcome:

There has been a nine percent increase in retention in the total enrollment at the training program for the year that the TDC has been in operation. For the second five-month cycle of implementation of the ABC's of Construction, a study was done to compare retention levels of students who participated in the TDC versus those who did not take advantage of the program. The results of the study indicate:

> Of eight selected first semester ELM students whose math scores on the TABE were below 8th grade level and who did not participate in TDC instruction, five dropped out of the training program within the first semester although three completed the semester. This translates into a 62% dropout rate for students who needed, but did not take advantage of, TDC services. Of the eighteen students in the TDC who were also enrolled in ELM 100 craft courses, only one failed to complete his or her craft course during the same semester. This translates into a dropout rate of 5.5% for those students who needed and utilized TDC services while attending regular ABC courses.

GOAL: To develop basic skills curriculum for the Training Center that coordinates instruction with the needs of the total workplace environment of the Baton Rouge ABC industrial construction worker

OBJECTIVE/TASK

To develop curriculum and instruction based on job- analysis and competencies required of ELM students and workers on the job

Documentation

1. Literacy task analysis completed for Electrical and Instrumentation, Millwright, Pipefitting, and Welding curriculum.

2. Readability levels computed for Electrical and Instrumentation, Millwright, and Pipefitting curricula

Outcome:

See Literacy Task Analysis Report prepared for educational providers in other Louisiana parishes, in Attachments. When the grant application was developed, job tasks were the focus of the basic skills curriculum to be developed. Dialogue with the site partner, ABC, emphasized the need for basic skills in the training program (the only way for most workers to become skilled craftspeople.) The task analysis focused on those skills needed for success in the training program and, thus, so does the instruction.

3. Functionally contextual curriculum (Main Ideas, Using the Context, Reading Charts and Tables, and Reading Diagrams) developed for Electrical and Instrumentation, Millwright, and Pipefitting curricula

Outcome:

See listing of 25 original modules of instruction in Attachments

4. Identification of safety words, sign colors in workplace contexts for reading students, using multi-media format

Outcome:

See Literacy Task Analysis Report in Attachments. Use has been made of language masters and tape recorders as much as possible in order to simulate the way that construction workers receive information in both training and on the job--verbally and visually.

OBJECTIVE/TASK

To provide instruction in basic math, reading,and writing that enhances student achievement in the ELM program

Documentation

1. Functionally contextual materials available for first-year ELM courses in Electrical and Instrumentation, Millwright, and Pipefitting curricula which provides math, reading, and writing instruction and applications

2. Instructional components based on a direct instruction and modeling format

3. Availability of commercial materials for reading, writing, and mathematics which appeal to adult interests in general, and, specifically, to the interests of adults in industrial construction trades

4. Availability of general interest software

5. Availability of math software modules on measurement, geometry, and reading graphs with applicability to construction trades

6. Word Attack" software (Davidson) which is modified to use technical vocabulary terms in Pipefitting, Millwright Safety, and Electrical and Instrumentation curriculum as identified by the literacy task analysis

OBJECTIVE/TASK

To provide GED program with 1 year gain in math or reading for every 50 hours of instruction by majority of students in GED strand

Documentation

1. Survey of student portfolios

Outcome:

The majority of students tested on TABE at 50 hours of attendance showed 2 grade levels of improvement in math, or in reading, or in language.

OBJECTIVE/TASK

To incorporate student input into design, implementation, and evaluation of project.

Documentation

1. Entry and exit forms in student portfolios in Project Manager's Office.

Outcome:

Students need to be encouraged to a greater degree to "have an opinion" about their course of study. Most workers felt that their goals were being met, but their goals were likely to be short-term ones.

2. Use of ELM students in pipefitting and electrical and instrumentation as paraprofessionals and/or peer/tutors

Outcome:

Using a second or third year apprentice student as a peer/tutor has proved to be positive. Not only do these paraprofessionals prove to be valuable in helping identify job-specific applications of skills, they also assist in "coaching" students through the apprehensions trainees have in the first semester of their apprenticeship program.

VI. COMMENTS AND RECOMMENDATIONS

1. A dichotomy exists on several levels between the purported beliefs of the program and the actual practices which are currently in effect. Although the Director of Education at ABC supports the need for basic skills instruction prior to craft program training, this support was not been completely implemented until the end of the first grant period. For example, the Education and Manpower Committee of ABC oversees the ABC training program. At the August 1992 meeting, the Director of Education made a motion to "strongly recommend" rather than require that program participants who scored at or less than a 6th grade math level complete a semester of TDC work prior to participation in a craft-training program. Although the motion was seconded and passed, even this "strong recommendation" was not being fully implemented until the end of the project. In contrast, our literacy task analysis indicated that an 8th grade level of understanding of math was appropriate for academic success in first-year programs. We, therefore, suggested that this be a requirement rather than a recommendation. One explanation for this conflict is the widespread belief among the contractors that if such academic standards are enforced, the classrooms in the ABC training program will be empty and fewer and fewer employees will receive any kind of training at all.

2. Some of the ABC staff members initially provided us with incomplete information and/or inaccurate perceptions on which to build our program. In short, if we asked the right questions, staff members would generally respond accurately. . . if we knew enough to ask the right questions. If we failed to know what to ask, information that could have been useful was rarely forthcoming initially. For example, curriculum developers were led to believe that reading the curricular materials was imperative to course success. Instead, much of the material is presented verbally. Math skills, rather than reading skills, pose the greatest problem for students in ABC programs.

3. Although lip service is certainly paid to the concept of better educated workers, some employers seem to prefer that workers remain less educated and, therefore, less of a threat to the status quo, as well as less entitled to financial increases. There is also the possibility of losing him/her to another contractor. Thus, there have been obstacles to overcome with the "good old boy" network as it exists in the construction industry in south Louisiana.

   Increasing awareness and the necessity of implementing total quality management procedures are the impetus that rarely existed a year ago in the Baton Rouge industrial

community. Many of the petrochemical plants are involved with ISO 9000 and will be requiring the subcontractors to do so, also. This requirement will give our program more strength if we tie the program goals and objectives more closely to it. Also, the Greater Baton Rouge Industrial Managers, a group of plant CEO's, has put into effect a requirement that all 16,000 plant workers must pass an 8-hour safety course by July 1993. There is suddenly more interest in basic skills on the part of employers and contractors who know their workforce has literacy deficiencies.

4. Utilization of the TABE as a pre-test assessment proved useful in a workplace program which is tied more strongly to classroom instruction with an enormous amount of printed training material. In addition, employers and ABC staff are more comfortable with the grade level equivalencies as opposed to standard scale scores or other scoring calibrations. Since readabilities result in grade level identifications, there is a ready correlation and the semantics involved in selling the program are facilitated.

5. The development of original curriculum evolved throughout the duration of the grant cycle. Initial efforts were often not used because: (a) instructional staff were not supportive of the "instructional modeling techniques," (b) easily used answer keys were not always available, (c) instructional staff concluded that materials were too difficult or easy. . . even without actual use. . . (d) teachers were accustomed to using commercial materials because they were available prior to the development of the original curriculum materials.

6. The numbers of people who participated never met the expectations of the numbers who need such assistance. Making the commitment to attend a voluntary basic skills program with no guaranteed financial rewards or future assurance of employability is difficult to achieve after a full day of work. In addition, some workers have different types of goals than those originally conceptualized in this grant. For example, not all workers want or need to complete an ELM program to reach the employment status they desire. Because of the shortage of highly skilled workers (e.g., those in advanced ELM levels or graduate journeymen), these students, with only a little training, can secure desirable high-level positions without all the necessary skills.

   Some students just want assistance in learning minimal skills needed to survive ELM first-level courses. Others just want a job and participate in ABC programs in order to increase their chances of employment. Still others want to pass specific tests of proficiency or meet employability requirements. This grant project successfully served many in these categories although the project "failed" to make them "graduates" of the ELM programs.

7. "Institutionalization" is assured. ABC is currently building a facility to house the TDC on a permanent basis. Also, it is to the credit of the Baton Rouge program that the project has been replicated in the Lake Charles training facility, with 34 students enrolled in basic skills after 209 workers were screened on the TABE. When and if computers

are utilized more in Lake Charles, the program should expand significantly as workers are extremely interested in being "seen" working at a computer by their peers.

8. Some staffing changes had to be made because individuals could not adjust to the innovative methods required by the design of the demonstration model. Staff development-- continuous staff development--needs to be emphasized in programs of this nature. One recommendation is the encouragement of regional/area workshops for staff of those involved in these projects, funded by the grants or held by the U.S. Department of Education.

VII. DISSEMINATION ACTIVITIES

ARTICLES:

Articles featuring the Technical Development Center have appeared in the following:

1. Improving Education in the Mid-South: Building Constituencies for Change; Resource report sponsored by Foundation for the Mid South, February 1992, Pine Bluff, Arkansas.

2. Merit Shop Message, Pelican Chapter newsletter, Associated Builders and Contractors.

3. BCEL Newsletter for the Business Council for Effective Literacy, January 1992.

4. The Baton Rouge Sunday Advocate, editorial "Job Training is Good But Big Problem is Trainability," April 5, 1992.

5. Workplace Literacy in Louisiana, resource manual published by State Department of Employment and Training.

6. "Impacting the Quality of Work and the Quality of Life: ABC's of Construction Program," A case study by Jorie Philippi prepared for Work In America Institute, Inc., April 1992.

7. Workplace Literacy: Reshaping the American Workforce, report by the U.S. Department of Education, Office of Vocational and Adult Education, Division of Adult Education and Literacy.

8. "Promising Practices" A.L.L. Points Bulleting, Adult Learning and Literacy, U.S. Department of Education, Volume 4, No. 3.

9. Training Center Student Newsletter, published by the Pelican Chapter Associated Builders and Contractors, Inc., Volume I, No. 8, August 1992.

10. "Student Profile" A.B.C. Merit Shop Messages, monthly chapter newsletter, Associated Builders and Contractors, Inc., November 1992.

Short notes also appreared in the Baton Rouge Business Report, the newsletter of the Greater Baton Rouge Chamber of Commerce, and the ABC chapter newsletter

PRESENTATIONS AND WORKSHOPS:

These presentations have been made by the Project Manager and staff:

1. National ABC Manpower and Education Conference, Atlanta, May 1992.

2. Texas Community College System, conference on Workforce Literacy, Dallas, Texas, May 1992.

3. Regional JTPA Conference, U.S. Department of Labor, Dallas, Texas, May 1992.

4. Louisiana Association of Public Community, and Adult Educators, Lafayette, La., May 1992.

5. Meeting of Project Directors, National Workplace Literacy Program, Washington, D.C., May 1992.

6. Participated with Chamber of Commerce and ABC Education Director to give workshop on our project at the state conference of International Employment Security Personnel Association, October 1991.

7. American Society for Training and Development, Baton Rouge chapter, October 1992.

8. Louisiana Association for Developmental Education Annual State Conference, Shreveport, La., October 1992.

9. Work in America Institute, Inc. networking meeting, New York City, October 1992.

INFORMATION PACKETS SENT:

Information Packets were sent to the following in response to requests; included were results of literacy task analysis, newspaper articles, brochure, etc.:

1. National Center for Research in Vocational Education, University of California, Berkeley, California.

2. Director, Lafayette Regional Vocational Technical School, Lafayette, Louisiana.

3. Associate Superintendent of Vocational Education, La. Department of Education.

4. Work in America Institute.

5. The following ABC chapters: Dallas, Texas; Austin, Texas; Mobile,Alabama; Pennington, Alabama; Little Rock, Arkansas.

OTHER:

On-site visit by St. Charles Parish officials who are working with the ABC training programs in their regions.

Meeting in Reserve, La., with British Petroleum, Shell, Union Carbide, and local vo-tech officials to begin planning a basic skills program for local plant workers; continuing participation in project.

Meeting with employer and trainer with ABC program for electrical apprentices in New Iberia, La., to demonstrate use of TABE and electrical competency screening test; assisted with selection of instructional materials.

On-site visit by school system officials from Lake Charles, La., literacy programs.

Meeting with JTPA consultants at LSU regarding workplace literacy programs.

Several meetings to advise contractor writing Louisiana State Manual for workplace literacy.

Work with the Mayor's Office to plan community-wide town meeting to be carried state-wide on public television; Associated Builders and Contractors is major sponsor of the event, entitled "Baton Rouge Workforce 2000: Are We Up to the Job?"

Meetings with Education Advisory Council of new governor's transition team in an effort to instigate policy for a state initiative for development of the workforce.

Conducted tour of TDC for new Louisiana Secretary of Economic Development.

East Baton Rouge Parish Schools
Adult and Continuing Education,
Greater Baton Rouge Chamber of Commerce,
and
Associated Builders and Contractors, Pelican Chapter

WORKPLACE LITERACY PROJECT

External Evaluation Report
FINAL REPORT

Prepared by
Jorie W. Philippi

January, 1993

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Prepared by Performance Plus Learning Consultants, Inc.

Introduction

Background: The East Baton Rouge Parish Schools Adult and Continuing Education, in conjunction with the Greater Baton Rouge Chamber of Commerce, was funded initially by an 18-month grant award from the U.S. Department of Education and local resources to provide workplace literacy services for the Associated Builders and Contractors (ABC), Pelican Chapter. The program, "ABC's of Construction," is housed in the Technical Development Center at ABC; it operated it's first cycle, with a 2-month no-cost extension, as a national workplace literacy project demonstration from March 1, 1991 through October 31, 1992, to determine the effectiveness of the Center's proposed workplace applications of basic skills training model. It has been re-funded to operate a second 12-month cycle, from November 1, 1992 through October 31, 1993.

The need for this project grew from a recognition by local educators, Chamber members, and ABC Pelican Chapter staff and member businesses and industries that the pressures of competition in a global marketplace have accelerated the pace of change in workplace environments. In order to provide a well-trained local workforce that will keep the Greater Baton Rouge area economically healthy, they perceived a need for something more than just technical training courses for industrial construction workers.

In Louisiana, over 90% of all industrial construction work is done by merit-shop, open companies, and the state-wide demand for workers in this field is growing. To insure a skilled labor force to meet the needs of the state's economy, the 275 local member companies of the Pelican Chapter of ABC, who are engaged primarily in the building and maintenance of area petro-chemical plants, each contribute several pennies for each hour worked by employees in their companies to underwrite the ABC training and facilities. Local workers and trainees are encouraged to attend the ABC training center who would like to become quality craftsmen and are employed or sponsored by a member of the Pelican Chapter.

The goal of participants in ABC training programs is to advance from unskilled labor positions, paying an average of $6.00 per hour, to certified journeymen, who average $15.00 per hour and generally work 2000 hours per year (not counting overtime). That equates to increased earnings for each participant of approximately $18,000 per year. Improving the earning power and job stability of the local labor pool ensures full

consumerism and the retention of a strong corporate employer tax base, which in turn bolster the local economy.

Because technical training-specific courses and traditional education often do not give workers a broad-based knowledge of team communication, problem-solving, critical thinking and learning-how-to-learn concepts and competencies, ABC determined the need for instructional programs that would provide their industrial construction craft trainees with workplace basic skills applications that are transferable and adaptable to their changing work environments.

The East Baton Rouge Parish Schools Department of Adult and Continuing Education began discussions with ABC and the Chamber in 1990 to foster the sharing of information and to clearly define local worker needs and agency responses. This careful exploration of possibilities resulted in their partnering to apply for federal grant monies for provision of on-site basic skills programs to accompany ABC's craft training courses. Administrators representing ABC's training and education departments met with the school district developers to ensure that the customized programs directly related to the competencies needed for their training courses and responded to the needs of the targeted worker participants. To this end, the education/public agency/business partnership members were committed to gathering data for performing a "front-end analysis" in order to assess the basic skills needs of targeted trainee-participants. They also determined program goals, scope of trade-related content areas, length, schedules, recruitment and implementation plans.

The developers of the program, project special hires that comprise a professional staff of six curriculum consultants and instructors with numerous advanced degrees and many years of experience in writing and teaching, then custom-designed, created and delivered the instructional program. Complete participant assessment procedures and a strong, functionally contextual basic skills training program were subsequently implemented and refined during the initial grant period. The school district, as the grant financial manager, contracted with Performance Plus Learning Consultants, Inc. to serve as a third-party evaluator throughout the project.

Purpose of the Evaluation: The East Baton Rouge Parish Schools Adult and Continuing Education Department has requested this third-party evaluation of their U.S. Department of Education Workplace Literacy Demonstration Project to assess 1.), the extent to which the project's goals and objectives have been accomplished, and 2.), the extent to which program development and implementation proceeded as planned. This report addresses only those activities conducted during the first cycle of funding, which concluded on October 31, 1992. Specifically, the evaluation objectives to be investigated were:

- on-going identification of the program's strengths and areas still needing any improvement throughout the life of the project;

- evidence that the basic skill levels of construction workers and craft trainees have been upgraded in order to increase their job security, productivity and potential for career advancement, through

  - provision of a technical development lab that is accessible, non-intimidating, and positive, as measured by enrollment and attendance rates;

  - provision of a basic skills program, in which 75% of completers achieve 80% mastery, as measured by job task-based competency tests developed by the project planning team);

  - provision of a GED program, in which participants demonstrate for every 50 hours of instruction a minimum of 1 year gain in math or reading on a standardized test ;

  - placement of 100-150 participants in individualized, self-paced courses of study that include opportunities for interaction with peer/tutor or group activities in problem-solving and workplace socialization as measured by completed participant and immediate supervisor questionnaires;

  - provision of basic math, writing, and reading skills that enhance participant achievement in ABC classroom craft-related training,

demonstrated by passing grades;

- evidence that basic skills curricula that coordinates instruction with the needs of the total workplace environment of the Baton Rouge industrial contractors has been developed through

  - assembly of a comprehensive project planning team with collective background experiences in curriculum development, adult basic education, vocational education, construction training, human relations, counseling, and development of individual learning plans;

  - use of a workplace literacy advisor for consultation on program design;

  - incorporation of employee/trainee participants' input into program design, implementation and evaluation;

  - use of a minimum of 30% customized instructional materials, developed from the results of specific job task analysis;

- evidence of a smooth instructional flow of activities within the curricula, reflecting a sound developmental approach to mastering those literacy skills necessary for competent performance of identified job tasks;

- evidence of the development and use of record-keeping and documentation systems, including collection, interpretation and reporting of data on program development and implementation activities and on individual progress of participants;

- evidence of successful program implementation through the use of appropriate processes for participant recruitment and selection, class scheduling, development of individual education plans, curriculum delivery, pre- and post-assessment, and instructor training and support, that are

academically and organizationally sound and that match with program goals; and,

- evidence of increased retention rates among employee/trainee participants, especially those in the first four years of construction trade employment, through

  - hiring of project personnel experienced in counseling and in development of individual learning plans;

  - provision of individual attention and counseling for participants in order to enhance their self-worth and self-competency, as measured by positive responses on attitudinal tests at the end of the program;

  - provision of program instructional component addressing workplace social skills, or workplace culture, available to all program participants;

  - involvement of participants' supervisors in program by encouraging feedback to participants and project planning team;

  - provision of basic skills remediation component to support ABC training program classroom craft courses success, based on analysis of classroom tasks;

  - interaction with human resource personnel of large area firms to develop attitudinal test and to track results for a two-year period;

  - reporting program progress to managers every three months;

  - collection of retention rates from a sampling of local firms for ABC program participants and non-participants to determine whether differences in rates exist;

- improvement upon 44% drop-out rate in ABC craft training program by end of funding period.

Description of the Project to be Evaluated: The ABC's of Construction Workplace Literacy Project consisted of a workplace literacy training partnership formed between the East Baton Rouge Parish Schools Adult and Continuing Education Department and the Pelican Chapter of the Associated Builders and Contractors, with assistance from the Greater Baton Rouge Chamber of Commerce. According to the published description of the program, the design of the project was structured to meet workers' and trainees' job-specific basic skills application needs in the industrial construction trades serving the local petro-chemical industry through the development of functionally contextual curricula. On-site investigation and job analysis conducted by project staff resulted in the development of some customized curricula and instructional delivery formats tailored to meet the various employer/worker needs of local ABC-affiliated industries. A brief description of the program follows:

> On-site job-linked and general math and reading instruction, along with GED preparation, safety vocabulary and test readiness training was offered as individualized, independent study, using 25 original modules and commercially available print materials, plus 5 computer work stations operating on a Novell system from a host, complete with a printer. The Technical Development Center began operations on August 5, 1991 and was open four nights each week from 4:00 p.m. to 9:00 p.m.with two instructor-facilitators in attendance for each session. Participants numbered from 2 to 20 per session. In addition, seven workplace "softskills" training seminars were conducted, with a total of 359 participant attendees. Overall, 649 workers were assessed and 204 were counseled. 107 participated voluntarily in an instructional program for from 10 to 268 hours each. A total of 2945 contact hours were provided. Average attendance was 44.63 hours per participant, with a median attendance of 29.13 hours.
>
> An expanding set of curricula continues to be developed and integrated with commercially available materials at the Technical Development Center. Twenty-five customized modules have been built from the results of literacy task analyses used to identify support basic skills applications common to the performance of critical tasks in four areas of craft skills training for entry-level mechanics: electrician, pipefitter,

welder and millwright. The customized instructional materials consist of print material course modules comprised of learner handouts for series of approximately 0.5- to 1-hour lessons; audio-cassette lessons accompanied by print; and, manipulative materials accompanied by print. Print modules include stated learning objectives, key vocabulary terms related to the concept being taught, direct instruction in concepts, guided practice, practice exercises, and application problems. Pretests and posttests were also developed for craft skills areas. All customized instruction contained work-specific examples for participants to use as vehicles for learning job-linked skills used by industrial construction workers and trainees.

In addition to the materials developed by the project professional staff, commercial print and computer-based materials were purchased to address both job-related and general academic skills for reading and math. In total, six strands of basic skills studies are offered: the entry-level mechanic trade-related strand; a two-course calculator use strand for ABC trainees who are already journeymen and want to learn special skills such as calculus or advanced algebra; Test Preparation for ABC trainees preparing for certification or other employer promotion tests; Level III reading for those who want to brush up or improve on general reading skills; and GED preparation.

The instructional materials were as follows:

<u>Project Staff-Developed Materials for Electrical and Instrumentation, Millwright, Pipefitting, and Welding Trainees</u>

Reading Main Ideas
Using the Context
Reading Charts and Tables
Reading Diagrams
Identification of Safety Words in Workplace Contexts
Reading Safety Signs (multi-media format)
The Construction Inch (manipulative materials)
Fractions
Decimals
Measurement

Commercially-Developed Print Materials

Tech Prep, (1988), Waco. TX: Center for Occupational Research & Development (CORD)

Applied Mathematics Program, (1989), "Metals & Welding," "Electro-Mechanical," Cleveland, GA: Piney Mountain Press, Inc.

Applied Mathematics: Industrial/ Technical Applications, (no date) "Getting to Know Your Calculator," "Learning Problem Solving Techniques," "Naming Numbers in Different Ways," "Using Trigonometric Functions," "Using Charts and Tables." Vocational Curriculum Development & Research Center, Louisiana State Department of Education.

Applied Communications, (no date). "Communicating with Co-Workers." Bloomington, IN: Agency for Instructional Technology.

Pipe Fitter's Math Guide, Johnny E. Hamilton.

Practical Math, Book 2, Worktext.

Blue Print Reading (Industrial) (1989) Finger Lakes Regional Education Center for Economic Development.

Fractions as a Tool, John Blackwood & Elizabeth Alden

Vocational Applied Mathematics: Metals

Basic Occupational Mathematics, David Newton, Portland, ME: J. Weston Walch, Publisher

Math: For the World of Work, (1990), Caleb Corwell, New York, NY: Educational Design, Inc.

Number Power 4: Geometry, Robert Mitchell & Donald Prickel, Chicago, IL: Contemporary Books.

Reading for Today, Levels 1-5, Steck-Vaughn.

Communication for Today, Levels 1-5, Steck-Vaughn.

Reading Skills for Adults: Blue Book, Red Book, Green Book, Brown Book, Steck-Vaughn.

Specific Skills Series, Levels D & E , Barnell-Loft
Working with Words
Following Directions
Using the Context

Locating the Answer
Getting the Facts
Getting the Main Idea
Drawing Conclusions
Detecting the Sequence
Identifying Inferences

Pre-GED Reading- Cambridge
Science
Social Studies
Literature

Reading for Occupational Trades, Metalwork, Electronics - Steck-Vaughn

Reader's Choice
Insights
Connections
Discoveries

Developing Reading Strategies
Challenges
Quests
Ventures
Insights
Summits
Horizons

GED Math- Steck-Vaughn

Basic Essentials of Math

Working With Numbers

Math - A Basic Course

Computer-Based Commercially Developed Materials

Attitudes Blaster

Geometry Programs

Geometry for Construction Workers: Understanding Formulas by Figuring Dimensions, Surface, Volume, and Angles for Industry Situations

Graphing

Habits
Math Programs
Mighty Math
Piney Mountain Reading Programs
Queque Computer Reading Programs, Levels C,D,E
School Days
Speed Reader
Understanding Units of Measure
Voltage, Current, & Resistance: Understanding Formulas by Using Ohm's Law
What's My Angle?
Word Attack!

Workshops in Workplace Dynamics - format for each was one hour of presentation and demonstration, followed by one hour of discussion and follow-up

1. *Getting Ahead in Baton Rouge Construction* Dr. Christal Slaughter, management consultant, and Jack Harris, local business owner- interpersonal and work skills that help in job retention and promotion.

2. *Reaching Your Career Potential in a Changing Economic Environment*- Steve Jenkins, Chamber of Commerce, and Lee Jenkins, ABC Education Director- predictions for construction work through the 1990s.

3. *Communication at Work*- John Taylor, personnel recruiter with J.E. Merit Construction Co.- verbal and non-verbal messages in the workplace.

4. *Developing a Strong Work Ethic*- John Williams, plant manager of Copolymer- the importance of attitude.

5. *What to Expect in an Interview*- Howard Delaune, Human Resource specialist at Dow Chemical- special hints about interviewing for a higher position, including resume information and dress.

6. *Asking for a Raise*- Panel of instructors and the training coordinator from ABC- information about approaching supervisors for a raise.

7. *Adapting to a Changing Workplace: Building on Our Differences*- Stephen Robinchaux, management consultant- aspects of prejudicial behaviors and a new view of quality in the workplace.

Staff-developed module print materials were desk-top published and laser printed with careful attention to uniformity of format, layout design, graphics and high quality reproduction. No instructor scripts were provided, allowing freedom in delivery and interpretation based on the professional discretion of each individual instructor. Each instructor occasionally incorporated personal learning materials and activities into the delivery of one or more lessons, as deemed appropriate for specific participants. Revisions were made to each course, based on craft trainer, instructor and participant feedback received.

Method

Design: The evaluation of the ABC's of Construction Workplace Literacy Demonstration Project employed a modified version of the Context-Input-Process-Product (C.I.P.P.) model, (Stufflebeam & Guba, 1971). This method of evaluation was chosen by the evaluator as the most suitable tool for investigating the evaluation objectives, (see pages 4-7), because it examines project effectiveness through structured analysis of the cohesiveness of project goals, components, and operations, independent from comparisons to outside standards or other programs.

The C.I.P.P. model was used to analyze:

- Context (i.e., shared goals and philosophy of key personnel and participants);
- Input (i.e., resources, including personnel, materials, time and facilities);
- Process (i.e., congruence of observed instructional development and delivery with project goals and research on instructional effectiveness); and
- Product (i.e., indicators of project effectiveness).

It is important to note that, due to geographical considerations, much of the on-site investigation was conducted by project staff and reported to the evaluator during the four site visits or via telephone communications from the Project Director. Forms and procedures for use in data collection across sites were developed by both PPLC and project staff.

Participants: The participants in the project were workers employed or sponsored by Pelican Chapter ABC-affiliated companies. A brief description of the available composite average participant profile is provided below for reference.

> White male, age 19-23 years old, with high school diploma or GED, employed in industrial construction for more than 5 years (n =102)

Because of the open entry/open exit nature of the program, participants in any one cycle of instruction were viewed as a separate group. Participant profiles changed slightly with each cycle of the program. For example, in the first cycle, August 5, 1991 through January 5, 1992, 38% of the participants were 19-23 years old and 85% were males; in the second cycle, January 6, 1992 through May 1, 1992, only 21% of the participants were ages 19-23 and 97% were males. More detailed demographic information about participants in each cycle is displayed in Figures 1,2, and 3.

Figure 1: Demographic Characteristics of Cycle 1 Participants (n=33)

Age:		**Ethnicity:**		**Gender:**	
19-23 years old	38%	White	69%	Male	85%
24-28 years old	19%				
29-33 years old	16%	Minority	31%	Female	15%
34-38 years old	13%				
39-43 years old	13%				
44-49 years old	0%				
50 + years old	1%				

Education Level:

0-8th Grade	**9th Grade**	**10th Grade**	**11th Grade**	**12th Grade/GED**	**Post Secondary (trade or academic)**
12%	1%	15%	1%	50%	12%

Length of time working in construction:		**No. of Participants in Strands of Study:**	
Less than 1 year	12%	Level III Reading	9%
1-2 years	12%	GED	24%
3-5 years	19%	ELM (trade-related)	30%
5 + years	50%	Test Prep	12%
		Calculator	3%
		Enrichment	21%

Please note: Not all participants reported data in all categories; therefore, all do not total 100%.

Figure 2: Demographic Characteristics of Cycle 2 Participants (n=28)

Age:		**Ethnicity:**		**Gender:**	
19-23 years old	21%	White	71%	Male	97%
24-28 years old	21%				
29-33 years old	21%	Minority	29%	Female	1%
34-38 years old	29%				
39-43 years old	1%				
44-49 years old	0%				
50 + years old	0%				

Education Level:

0-8th Grade	**9th Grade**	**10th Grade**	**11th Grade**	**12th Grade/GED**	**Post Secondary (trade or academic)**
14%	1%	19%	1%	50%	11%

Length of time working in construction:		**No. of Participants in Strands of Study:**	
Less than 1 year	29%	Level III Reading	11%
1-2 years	11%	GED	21%
3-5 years	19%	ELM (trade-related)	50%
5 + years	43%	Test Prep	0%
		Calculator	0%
		Enrichment	18%

Please note: Not all participants reported data in all categories; therefore, all do not total 100%.

Figure 3: Demographic Characteristics of Cycle 3 Participants (n=41)

Age:		**Ethnicity:**		**Gender:**	
19-23 years old	7%	White	76%	Male	78%
24-28 years old	13%				
29-33 years old	21%	Minority	24%	Female	22%
34-38 years old	8%				
39-43 years old	13%				
44-49 years old	8%				
50 + years old	0%				

Education Level:

0-8th Grade	**9th Grade**	**10th Grade**	**11th Grade**	**12th Grade/GED**	**Post Secondary (trade or academic)**
25%	6%	11%	8%	34%	14%

Length of time working in construction:		**No. of Participants in Strands of Study:**	
Less than 1 year	18%	Level III Reading	10%
1-2 years	16%	GED	34%
3-5 years	32%	ELM (trade-related)	29%
5 + years	32%	Test Prep	10%
		Calculator	0%
		Enrichment	17%

Please note: Not all participants reported data in all categories; therefore, all do not total 100%.

In comparison, the demographics for ABC trainees who participated in training at the Center during 1991 were:

- 21% minority, 79% white;
- 94% male, 6% female;
- 10% had no GED;
- 10-15% had post-secondary trade or academic training;
- most were high school graduates;
- average age was 28 years old;
- married with one child; and,
- only 35% were local residents, with most students commuting long distances to attend.

Instruments: Data for this evaluation were requested and gathered via pre- and post-program learner surveys, structured interviews with learners, ABC craft instructors and program personnel, instructor anecdotal report forms and questionnaires, and formally-documented observations of instructional sessions and reports of instructor training. Additionally, data were gathered from detailed analysis by the evaluator of program

documentation, instructional materials, and learners' work, (i.e., pre- and posttest scores and learners' records).

Procedure: Following initial telephone and in-person conversations with the Project Director to establish evaluation objectives, the evaluator conducted the activities listed below. Four site visits were made during the initial demonstration period in May and September of 1991 and February and October of 1992.

1. Development of Evaluation Data Collection Instruments:

   - Forms created for Participant Pre- and Post-Program Surveys, Instructor Interview, Instructor Anecdotal Records, Learner Individual or Focus Group Interview, Classroom Observation, Craft Instructor/Supervisor Interview, and Program Administrator Interview.

2. On-site consultation with project director and curriculum developers concerning instructional curricula design and development and feedback on how to strengthen activities contained in them.

3. On-site interviews with training and project managers, supervisors, instructors, project director and learners.

4. On-site observations of learning activities during various cycles of instruction.

5. Off-site analysis and review of materials and collected data from site.

6. Communications and Operations:

   - Contact throughout grant period with project through conversations with project director Pam Wall, to discuss project goals, progress, and evaluation activities and preliminary findings.

- Final Evaluation Report submitted to project director
  January , 1993

Results

Project Context:

To what extent are goals and philosophy of the project shared by key project personnel and learners?

This section of the evaluation is a comparison of the project goals and priorities as reported in project descriptions and interviews with key project personnel, including:

- project director
- business partner from Pelican Chapter, ABC
- project curriculum developers
- managers and trainers, ABC
- project instructors; and
- learners.

These viewpoints about project goals were analyzed for consensus and divergence.

The published project goals and purposes are contained in the grant proposal submitted to the U.S. Department of Education. They were developed cooperatively following communication between the school district, the Chamber and partnering business ABC, prior to applying for the grant monies. Stated goals in the grant proposal were:

- upgrading basic skills of construction workers who are attending a merit shop training program in conjunction with their employment with an affiliate of the Associated Builders and Contractors in order to increase job security, productivity, and potential for career advancement.

- developing basic skills curricula for the [ABC] Training Center that coordinates instruction with the needs of the total workplace environment of the Baton Rouge ABC industrial construction worker.

Project Director and Business Partner- On May 21, 1991 Pam Wall, Project Director, from the East Baton Rouge Parish Schools Adult and Continuing Education Department, and Lee Jenkins, Director of Education for the Pelican Chapter of ABC, were interviewed about their perceptions of program goals and philosophy. They articulated the following project goals:

- to better prepare ABC trainees for employment opportunities of the area petro-chemical industries and enable them to work safely in sophisticated environments; to make available job opportunities obtainable for participants;

- to provide a 50-50 balance in instruction between workplace-related skills and every day life skills so that participants can survive in society;

- to increase retention rates in the ABC training program because trainees have to complete their certifications to get anywhere in their companies;

- to have a successful demonstration project that becomes an impetus for starting other local projects.

Project Curriculum Developers- were interviewed individually and as a group during one or more of the four site visits. The goals expressed centered around improving the quality of life for workers and the community. All four developers mentioned wanting to impact on participants' self-perceptions, motivation toward lifetime learning, and empowerment to achieve better working relationships with industry employers. One developer noted that the entire community benefits because it is a safer place to live when the petro-chemical plant workers are doing their jobs well.

Three of the four curriculum developers that worked on the project all stated program goals that focused on participants' improvement in basic skills used for competent job performance *and* improvement in everyday life skills. One developer/instructor expressed strong feelings that instruction should begin as a 50-50 split between workplace and everyday life basic skills applications, two felt that a 75% work-related/ 25% life skills curriculum was appropriate, and one (the computer systems developer) that the program

should be 100% job-related in nature. Some of the developers specific goal statements included the following:

- to have a program that improves job security for participants;
- to provide participants with something that they can use for future jobs, for life;
- to instill a desire for learning in the participants so as parents they can help their families with literacy; and,
- to enable learners to function well in technical and math-specific environments by applying skills; if they can't do this, they're at a dead end.

Managers and trainers at ABC- Classroom craft trainers and the training program manager were interviewed in a focus group and individually during the site visit conducted on September 23, 1991. Comments from all stressed the need for basic skills to support the technical craft training for workplace activities. The majority of the group mentioned the goal of having instruction be 70-80% work-related. One trainer noted the goal of having employees improve their self-esteem so that they could better handle new responsibilities and develop good attitudes about job performance. Another trainer specifically noted the need for improving math to enhance working with craft formulas.

When asked to identify performance indicators for superior trainees at ABC, i.e., those students whom the trainers would recommend first to employers for vacancies, the group listed the following attributes:

- dependability
- good attitude
- motivation for self-improvement
- assisting others
- learning quickly
- teamwork
- good questioning skills

Several of the trainers and the two managers reported anecdotal evidence suggesting that participants who have elected to attend the functional context basic skills classes exhibit better workman-like behaviors demonstrating the attributes listed above.

The attributes listed each represent trainee qualities commonly valued by trainers and worksite supervisors alike. (Many of the ABC trainers also hold supervisor jobs with local industrial construction and petro-chemical industries.) Although not necessarily taught directly during program instruction, the basic skills applications that were taught are, in fact, imbedded in the competent performance of behaviors that demonstrate the attributes. For this reason, the performance indicators trainers and managers listed are valid measures of the transfer of learning from program instruction to job performance.

Project Instructors- Six part-time instructors and peer tutors were interviewed during two site visits, in September, 1991 and in February, 1992. All concurred that the emphasis of instruction should be on work-related skills, but that life skill applications should not be omitted. Suggested ideal balances of the two ranged from 75% work-related/ 25% every day life skills to 90% work-related/ 10% life skills. Comments in response to a structured interview question asking about program goals for participants included:

- that participants can succeed at what they're after; when they finish class they should be able to do things they couldn't do before;
- to enable participants to advance in their own job positions;
- improved participant scores on tests and demonstrated improvement in ability to handle [work-related math] problems;
- observed participant success with and/or mastery of instructional materials; and,
- passing the GED test.

In contrast to their statements espousing instruction that emphasized work-related skills, none of the instructors or participants was observed using the customized curricula by the evaluator during any of the four site visits.

Learners- Goals of participants were collected in individual interviews during site visits and on pre-program and post-program surveys administered by project staff throughout instructional cycles. During interviews, participants responded to the question, "*Why did you take this course and what did you want to get out of it?*" with statements that included the convenience of having instruction located at the training center, the desire for a skills refresher to get back self-confidence, and the need to master skills to "get a GED."

PPLC collected and analyzed goal statements from the project director, managers, trainers, curriculum developers, instructors, and participants. For a discussion of areas of convergence and divergence, please see the evaluation section, "Summary of Results," under Discussion. PPLC next investigated the input of resources to the project, which is addressed in the next section of the evaluation.

Project Input:

> What resources were available to the project during development and implementation and to what extent were they used effectively?

This section of the evaluation addresses major resources of the project. It includes program instructional materials, design and appropriateness for the targeted learner populations; key personnel qualifications and the match between published project duties; and facilities. It also examines the content and processes used for instructor training. The data presented in this section were analyzed for strengths and weaknesses.

Program materials- The instructional materials were designed and/or purchased for use at the ABC Technical Development Center after developers conducted literacy task analysis of various targeted job tasks. Documentation of the literacy task analyses was made available and program developers spoke knowledgeably about the procedures they had used for interviewing and observing trainees and craft instructors and analyzing materials to determine basic skills applications used in job training tasks performance. Based on discussions with trainers, managers, developers and the program director, the choice of math and reading skills contained in instructional content and objectives was that identified as necessary to support participants' performance of targeted job tasks and procedures.

Review of the curricula revealed numerous job scenarios and examples taken from workplace situations and/or craft training materials. Instructional materials and workplace examples they contained were reproduced at a high level of quality and were up to date. The commercially-developed materials selected for general basic skills development and GED preparation addressed enabling skills that support mastery of the customized curricula.

The ranges of reading difficulty level for the various instructional materials appeared to match the ability levels of targeted participants. Diagnosis of ability levels of targeted course participants was accomplished by means of TABE (Test of Adult Basic Education) tests and project staff-developed functional craft math tests. These were administered prior to curriculum materials development or delivery to ensure a match between program participant ability levels and planned instruction. TABE tests targeted participant comprehension and performance levels at grade levels 9.0 or higher, and along with

program developer-made tests were used as instructional pre-test instruments for placement of program participants in materials that would be most likely to benefit them. Participants were counseled individually about their learning plans following assessment.

The schedule for curriculum development for pretests, posttests and modules called for components to be prepared incrementally across the life span of the initial funding period. None of the curriculum writers mentioned difficulty adhering to the time lines for deliverables; however, the project director reported that on-line instruction in industrial construction algebra lessons was not delivered in a timely fashion and had not been completed by the end of the funding period. She also expressed concern over the inefficiency and bottleneck resulting from curriculum developers not working directly within a desktop publishing application; all print instructional materials developed required labor-intensive copy typing in order to be transferred into a publishable format. This time-consuming procedure was exacerbated by the editing/revising process, which had still not been completed by the end of the funding cycle.

When asked about the strengths and weaknesses of instructional materials, the majority of participants thought the content reinforced skills they needed. 100% of the handful of program participants completing post-program surveys reported that the materials were stimulating; 75% reported that the instruction was extremely useful on the job; and 100% reported that the instruction was moderately to extremely useful outside of work. 100% also reported that the materials were easy to use and relevant to their goals, and that the program was exactly what they had expected and needed.

No instructor scripted guidelines for individual course sessions or overall use and integration of materials were developed; instead, instructors were left to use professional judgement for matching materials with participant needs, based on the assessment instrument scores. Instructors appeared unfamiliar with the content of some instructional materials, and tended to repeatedly use their personal "favorites." Variations in instructor communication styles and personalities appeared to impact on quality of instructional delivery, as well.

Key Personnel- Instructors and developers were seasoned teachers and professors with expertise and years of experience in adult basic education, corrections, higher education and developmental studies. Instructor and developer credentials and experience

included three PhD degrees and one candidate and 2 Masters degrees plus, with studies in Education, Psychology, Vocational Education and Special Education. Five hold teaching certificates and all have multiple years of teaching experience with adults. Only one developer had previous experience with creating functional context materials for workplace instruction. The other developers and most of the instructors commented, however, on the positive aspects of learning new techniques and of having compensated time for development and refinement of the materials to be delivered.

The project director, Pam Wall, has a Masters degree in Humanities and extensive experience in adult education, project planning and management. Ms. Wall's credentials include a lengthy list of educational research studies and investigative work in the area of adult learning and program administration.

Facilities Instruction was conducted on site in ABC's Technical Development Center.. The meeting room were adjacent to craft training and shop areas. The facility appeared well lit and conveniently located, with adequate space for conducting individualized learning activities and counseling. One participant commented on the post-program survey about interference from excessive outside noise during instruction. This condition was not observed by the evaluator during any of the four site visits and was not reported by any other participant or staff member.

Instructor Training- Initial training was provided for the project planning team staff (curriculum developers and project director) in the form of a workshop, delivered by the evaluator during the initial stages of the grant period. The purpose of this one-time, 1-day workshop was to convey information to project staff about the functional context approach to workplace literacy, the development of workplace literacy curriculum, and the importance of establishing local indicators to measure content mastery and impact on craft training. Curriculum developers and the project director then fine-tuned their program design.

Informal feedback/ training sessions (estimated to have been for 36 cumulative hours) were provided for the instructors on instructional delivery techniques and program operation guidelines. As a rule, the program director and key personnel reported that topical issues and concerns about program operations were freely, and sometimes heatedly, discussed during these sessions. The evaluator was provided with a video-tape of one hour of an inservice session, conducted on January 18, 1992. During the session, concept

modeling strategies were discussed and demonstrated by one of the developers. Five instructors role-played various innovative teaching delivery ideas. The video did not make clear the purpose of the instructor role-play activities, but all staff members participated enthusiastically throughout the hour.

A "Staff Manual" was also developed during the course of the demonstration. It contains information about operational and assessment procedures, forms and directions for developing Individual Learner Profiles, anecdotal record reporting forms, lists of available prescription curriculum materials for math and reading, and information on instructional methodology.

For a discussion of strengths and weaknesses of available project resources and the effectiveness of their use, see "Summary of Results" under Discussion section of the evaluation. The next section of this evaluation examines the process of project delivery.

Project Process:

To what extent were program development and observed instruction congruent with project goals and research on instructional effectiveness?

Instructional Organization- Six hundred forty nine ABC trainees were assessed during intake with the TABE test. In addition, the Piney Mountain math test, a reading competancy test, and a supplemental writing sample for GED prep students were used with 107 participants. Instructors then used the results to diagnose participant needs and develop Individual Learning Plans with selected skill content materials at appropriate levels of placement. Three assignments were given initially to determine accuracy of placement by participant progress. No guidelines were developed for local progress criteria or indicators other than the grant-stipulated goal of an increase in 1 grade level of participant ability after every 50 hours of instruction, as measured by standardized tests.

Instructional sessions held during the project were of 5 hours duration and met four times per week, Monday through Thursday, from 4:00 p.m. to 9:00 p.m. for three 5-month cycles. The Technical Development Center offered program instructional services for a total of 261 days, or 1305 hours. Individual participant files and cumulative records were observed to be up to date and included test scores, intake forms, ILPs, records and examples of current participant work.

The nature of instruction and types of learning activities were determined through observation as well as interviews with both instructors and learners. Both learners and instructors reported that approximately 90% of instructional time was spent working independently, 10% of time spent working with others. Records from 3 instructional session observations by the evaluator indicated an average of 20% of instructional time was spent in one-on-one instruction with participants. This compares favorably with an ideal of less than 50% teacher-talk during any one instructional session (Goodlad). On-site interviews and observations occurred two times during the middle phase of the project, in September, 1991, and February, 1992.

Instructional Engaged Time- Learner engaged times during observations was quite high. Most learners appeared to want to learn, seemed to enjoy moving through the instructional units, and spent 85%-95% of time in the classroom actually working on paper-

pencil exercises or with the instructors; the evaluator did not observe any participants working at the computer stations during visits. The program participant engaged time and interaction with instructor(s) compares well with engaged times of 40%-50% reported for observations of high school classrooms (Mikulecky). Adult learners came ready to work and managed twice as much effort per hour as adolescents manage in school rooms.

Instructional Quality- The quality of instruction provided by the materials has been discussed earlier in the Input section of this evaluation. It was, for the most part, quite high. Three of the five instructors observed had established good rapport with learners and took an active role in monitoring learner progress, encouraging learners, and providing explanations when necessary. The other two instructors appeared reluctant to approach learners unbidden to monitor thinking processes and accuracy of work in progress. They remained seated at their own desk or table, only interacting when participant's requested help with specific exercise items. During one observation visit, the instructor was totally absorbed in work at a computer station on material not related to the participants' assignments.

Solid judgements of the quality of instructor explanations of concepts were observed in each site visit. Consistency in instructor ability to explain the thought processes for the job-related basic skills applications procedures being taught or individualize selection of primary and alternate instructional materials based on informal diagnostics was not evident. For example, not all instructors were able to explain several approaches to mathematics in a manner that elucidated the thought processes involved. Several instructors observed fell back to simply repeating procedures from instructional materials or stating step-by-step processes for memorization. This contrasts with the developers' intent for use of the customized curricula and with current state-of-the art transfer of learning practices for workplace literacy in both the military and private sectors that result in highly effective application of instruction with training that refocuses instructional delivery practices from the teaching of memorized procedures to the teaching of comprehension via modeling the thought processes (metacognition) used in applying skills to performance contexts.

For a discussion of project process, please see "Summary of Results" under Discussion section of the evaluation. Following receipt of final data in March, 1992, PPLC assessed program outcomes (or "product") to determine the degree of project effectiveness.

Project Product:

To what extent are there indicators of project effectiveness?

The C.I.P.P. model enables gathering of evaluation data from more than one source to promote triangulation of results in an attempt to arrive at valid conclusions concerning project effectiveness. PPLC evaluated the ABC's of Construction Workplace Literacy Project from four different perspectives of the users:

- participant pretest/posttest scores and survey statements concerning achievement of personal learning goals and value of the course(s);
- anecdotal reports from instructors, recording participant applications of course content to work-related and everyday tasks outside of class;
- interviews with ABC education and training directors to discuss perceived program effectiveness and future commitment to its use at the training facility; and,
- structured exit interviews with curriculum developers, instructors, and the project director to determine their reactions concerning program effectiveness.

Meeting Participants' Goals- The first aspect of project product effectiveness was collected on pre- and post-program surveys and from on-site interviews of data concerning the degree to which participants in the various programs were able to achieve their personal learning goals. During interviews, most learners expressed satisfaction with the content of courses. A frequently mentioned asset was the building of confidence that enabled participants to use the skills they were learning in order to improve current job training task performance or prepare for GED or industry promotion tests. In asking learners to rate the program, the evaluator heard that the contents, instructors and schedules all earned "A" or "B" grades. Participants' reasons included liking the individual attention because they got encouragement and their questions were answered; instructors who seemed to really understand participants' needs and were able to explain things well, convenience of meeting

times and location, and the relevance of materials to their personal and training needs. Suggestions for improvements were few; those that were mentioned included a desire for a quieter learning environment and more hours to use the Technical Development Center.

Participants completed data collection forms that asked if their program "had helped [them] reach or make progress toward any of [their] personal goals;" 75% reported that it had. 88-94% of participants reported that they felt that they had "learned a great deal" and the time spent in the program had been an "excellent use of [their] time." Additionally, when asked if they "would recommend participation in the program to a co-worker," 100% of the learners reported that they would.

Learners completed data collection forms that asked them to rate their program on polarized scales for the program's interest level, usefulness on the job, difficulty level, usefulness outside of work, and whether or not it had been what learners expected. The results obtained from forms collected indicate that all participants rated the program as excellent or very good almost every category. See Table I for detailed results.

Table I: Participants' Rating of the ABC's of Construction Program

(Excellent)	5	4	3	2	1	(Poor)
Very Stimulating	76%	24%	0%	0%	0%	Very boring for me
Very Useful on the Job	70%	24%	5%	0%	0%	Totally Useless on the Job
Very Useful outside of Work	94%	6%	0%	0%	0%	Totally Useless outside of Work
Exactly What I Needed	94%	6%	0%	0%	0%	Not at all What I Needed
Exactly What I Expected	88%	6%	6%	0%	0%	Not at all What I Expected

Paired sets of TABE and competency pretest-posttest scores evidenced average gains of 2.80 grade levels in math and 2.02 grade levels in reading after 50 hours of instruction, and 60-80% improvement on competency tests. The following data were collected:

Competency test in math:

Average pre-test score = 64% Average post-test score = 81.3%

TABE test in Reading:

Average pre-test score = GL 9.00 Average post-test score = GL 11.02

TABE test in Math:

Average pre-test score = GL 7.50 Average post-test score = GL 10.20

Based on participant goal statements and their close match with program instructional content and objectives, the pre-/posttest gains provide strong evidence that programs were effective in helping participants work toward or achieve their personal learning goals.

Responses on softskill seminar evaluation forms by participants indicate that they now know or can do the following things that they did not or could not prior to attending the seminar(s):

- I understand economic development and growth in the future.
- It helped me to know where the job is going in the future and to know that there are people willing to help us, as [employer name].
- Have different ways now to help strengthen my attitude toward the future.
- How I can make a big difference in the workplace, how to take pride in my work, and how to get along with other workers.
- There's a lot of helpful information out there if you go out and use it.
- The country is changing; a person must be treated like a human being to put out his best.
- I'm going to get more involved with the legislature.
- Where your and my money is going and what we can do about it.
- How I can change things by voting and just becoming involved.

Instructor Anecdotal Records- To determine how and if learners were transferring new concepts and skills to applications on the job or outside of work, PPLC requested site instructors to report any instances of participants referencing situations in which they were using outside of class what they learned. An anecdotal recordkeeping form was supplied for this purpose. Information was gathered by only a few instructors. Comments included:

- When we presented info to ABC [trainers] about the program, a pipe-fitting instructor gave a "testimonial" -- unsolicited! He said one of his students came for help to the TDC and went from a 75 to a 90 grade point average. The trainee also said what he learned helped him in all he did.

- The learner said that his foreman was trying to figure the total length of some pipe. He knew how much was buried and how much was exposed. The foreman told the learner that he was having trouble getting the total length because he was having trouble adding fractions. He asked the learner to add the fractions. The learner did add the fractions and the foreman was quite impressed. This was clearly a good experience for the learner,who's presently working on fractions [in the program]^.

- The learner said that the first thing the ABC trainer started the course with was right triangles and that he remembered what we had worked on in TDC back in the fall.

- The highest scoring student in the Electrical and Instrumentation 100 class attended the TDC for six months of basic skills instruction before beginning the craft training courses.

- A pipe-fitting trainee was failing his craft training courses in Pipefitting 100; he withdrew, spent one semester in the TDC, then re-entered the craft course (same class, same trainer) and passed the next semester.

- Two millwright apprentices were able to remain in their craft training courses because of the supplemental math instruction they received simultaneously at the TDC; without the workplace literacy program, they would have had to drop out. One apprentice's salary rose from $5.00 to $11.00 per hour when local media did stories on televison and in the newspaper about his dedication to learning.

- All TDC students thus far have passed the written 8-hour OSHA safety test that will be required of all 16,000 plant workers in the Greater Baton Rouge area as of July, 1993.

Interviews with ABC Education and Training Directors- During site visits in February and October of 1992, the evaluator interviewed Education Director, Lee Jenkins, and Training Director, Ronnie Gregoire. Both reported that the program appeared to be effective. They cited improvements in retention of craft trainees, which they attributed to the assessment and instruction offered as support to those entry level mechanics who would have otherwise experienced difficulty, and possible failure, in mastering the content of the craft courses. Data collected on trainee retention before and after the initial funding period for the program indicates the following:

- From 1988 through 1990, prior to program start-up, the yearly percentages of completers out of those who enrolled for ABC training was 60-71%. In 1991, and projected for 1992, the percentage of completers was 80%. This is estimated to be a 9% decrease in dropouts in the ABC Entry-Level Mechanic training course.

- New enrollees in the Entry-Level Mechanic craft training course at ABC were tracked during the first semester. Of the 18 who participated in the workplace literacy training simultaneously, only one failed to complete the semester course work on schedule. This equates to a dropout rate of 5.5%. Of the 8 enrollees whose math placement scores were below grade level 8.0 (as measured by the TABE), and who did not particpate in the workplace literacy training component, five dropped out during the first semester. This equates to a dropout rate of 62%.

Jenkins related information about representatives from a prospective ABC-member company who had toured the facility and visited the program's Technical Development Center. They were so impressed with the program that the company joined ABC and has already begun to bring its workers to the TDC for assessment and instruction. He also reported an increasing number of ABC-affiliate company supervisors calling to request slots for their employees to participate in the program. The expanded trade-related basic skills component of ABC is serving as an incentive to many of the 100 local contractors who work with 63 different plants, with as many as 3000 workers per contractor; in a phrase, TDC/ABC business is booming.

Jenkins and Gregoire said that program institutionalization is assured, with the construction of permanent facilities for the TDC already underway in the form of a new $750,000. expansion to the ABC Training Center. The new building will house instructional facilities and a computer lab for use with the basic skills component of ABC training and instruction. In addition, the TDC program is in the beginning stages of replication at the Lake Charles, Louisiana, site of the ABC Pelican Chapter, with 34 participants currently enrolled.

Structured Exit Interviews with Curriculum Developers, Project Instructors and the Project Director- During the final site visit in October, 1992, the evaluator conducted a series of structured interviews with key project staff to determine their perceptions of levels of program success. Each group was asked to list the "best and worst things about the program and what they learned from working with the program." The following comments were recorded:

Best:

Curriculum Developers-

- the opportunity to create program materials and to schedule delivery across the project timeline allowed our use of creativity.
- had time to think about how people learn, i.e., how I could explain concepts to enable learners to think about it more than they would have.
- interaction among the four of us, learning about a new thing, i.e., workplace literacy, and learning from each other.

Instructors-

- individualizing allows instruction to be focused; the student just gets what they need.
- the participants are willing to work, willing to learn, taste success; this results in developing positive attitudes-- and good PR for the program.
- learning is tailored around the participants' schedules.
- can really get involved with each student, one-on-one, help

them set goals for their futures and improve their self-images.

Worst:

Curriculum Developers-

- we were never completely on target with what the students needed and with deadlines...
- led to believe that all the craft technical materials were used in the courses and necessary to it; not so; actually, much of the text is skipped, covered orally; math proved to be much more important to passing courses than reading tech materials-- we found this out after we had already done a great deal of work on developing craft-related reading skills instruction.
- problems in getting the text into desk-top publishing format.
- problems with getting the instructors to use what we had created in order to get timely feedback for revisions.
- recognizing that customized curriculum cannot be created in 90 days!

Instructors-

- unable to get students to come back sometimes after testing sessions (3) in order to participate in instruction.
- discomfort with using newly created materials that aren't yet completed; much more comfortable using materials I'm familiar with, especially in one-on-one instruction.
- customized curriculum was difficult to use and confusing; didn't think it applied to what the students really needed; it was too advanced for them.

What was Learned from Working with Program-

Curriculum Developers-

- using literacy task analysis as a way to approach curriculum design and development.
- how a lathe works; names for all those different kinds of screw drivers.

- a new chance to see information for the first time and remember how it feels NOT to know.
- even good teachers need inservice long before they begin to deliver program instruction (Day 1!)
- that we knew more about workplace literacy than we thought we did.

Instructors-

- how much a person is willing to sacrifice to learn.
- to be flexible.
- to change what's there to work with [materials] into what is needed.
- that I really enjoy teaching in the workplace/training environment; it's very rewarding.

Project Director-

- that we needed more role definition to enable comfort levels with different areas of instruction.
- that a teams approach is difficult to use.
- that there are underlying power struggles and politics in any grant that have nothing to do with the location.
- retaining students is difficult; hard to get exit forms if they just stop coming; can't find out why.

For a discussion of program product, or outcomes, please see "Summary of Results" under the Discussion section of the evaluation report, which begins on the next page.

Discussion

Limitations of this study- There was one factor that acted as a limitation on the ability of this study to draw definitive conclusions from the evaluation. This was the difficulty experienced by the evaluator in collecting and obtaining some of the requested data from some of the program partners in the formats required for inclusion in the evaluation. The conduction of data collection from a distant location for the majority of the demonstration period placed excessive responsibilities on an already over-burdened local project staff. Although the staff in this project exhibited an exceptionally cooperative attitude, the unavoidable off-site monitoring functioned as a somewhat limiting factor in this evaluation in that there was a minimum of direction and no training available in using the various data collection instruments that were developed.

Summary of Results- The following statements provide summary and discussion of key findings from the evaluation of project context, input, process, and product.

Context - The extent to which the goals and philosophy of the project were shared by key project personnel and learners was found to be as follows:

Areas of consensus: There was a good deal of consensus about program goals among the project director, ABC directors, and program developers. All highlighted the importance of the instruction as a means for mastery of basic skills and their applications to job training tasks and requirements. The use of these skills to foster workers' and trainees' abilities to enhance career opportunities and job performance was mentioned by all. Participants also commented on their desire to improve these skills and on the programs' relevance to accomplishing their personal goals.

Areas of divergence: The main areas of divergence were evidenced during comparisons of interview responses and actions of the instructors who seemed more interested in delivering traditional basic skills than the custom-designed functional context materials addressing the project goal for program impact on job training task performance. This resulted in a tension throughout the project that was evidenced in repeated flare ups during inservice training sessions and non-use or mis-use of prepared materials.

These observations should not be taken to mean that project staff were not doing their jobs. Participants expressed indications that they perceived themselves to be learning skills they could apply in the workplace and training courses and were having their needs met. Most learners were satisfied with their experiences, sometimes because of instructor personal attention.

It is likely that instructors will maintain whatever learner goals they have used previously in academic settings. It may be, however, that with development of better preservice and inservice training sessions, this philosophical divergence might have been alleviated.

Input- The availability to the project of resources during development and implementation and to what extent they were effectively used was found to be as follows:

Strengths and Weaknesses - The curriculum materials developed for the program contained numerous job task examples of skill applications, enabling learners to practice skills in ways they would use them in craft training or in the workplace. Resources for program development appeared adequate financially for instructional delivery. Purchased commercially-developed materials were of a high quality and integrated well with the custom designed curricula. Materials development time lines incorporated across the delivery time lines of the program might have impacted much more greatly on the stress levels of less experienced developers. Although committed to the project, the developers reported the necessity for spending significant amounts of time beyond what was compensated in order to complete their job tasks.

Desk-top publishing and revisions were reported as key issues that created bottlenecks in curricula production and availability for delivery. These might be addressed by: 1., having developers work directly in the publishing application on compatible computer equipment; and, 2., limiting and tightly scheduling the number of revision rounds.

Content of most of the program curricula was well designed, including the modeling of thought processes. The resulting original materials created for the project contain strong lessons that offer participants opportunities to develop cognitive awareness of their thinking

strategies during applications of basic skills to job tasks, and that enhance the probability of continued application of those skills learned. The inclusion of pre- and post-tests or assessments for all curricula would provide strong evidence that participants made progress in mastering the content of the programs. Scripted instructional delivery guidelines would eliminate the confusion and variations in content delivery by the instructors to ensure better use of materials and the quality of instruction.

Instructor and program developer qualifications and previous experience were rich and highly professional; they provided a definite enhancement to the program overall. Criteria might be derived from a composite profile of the qualifications and background of these key personnel for use as hiring guidelines for project or program institutionalization or replication.

Instructor training sessions proved to be somewhat inadequate; they failed to provide the support system that the program needed for full acceptance by the instructors, congruence of purpose and mastery of techniques. One suggestion is to provide instructors with pre-service training in functional context curriculum development so that they more fully understand the philosophy of this approach and the purpose of lesson components/exercises.

Process- The extent to which program development and observed instruction were congruent with program goals and research on instructional effectiveness follows:

Areas of convergence and divergence: Learner engaged time was quite high and learners spent 85-95% of time in the classroom actually participating in skill building activities. Both instructors and participants appeared motivated to take full benefit of instruction time and took pride in the efforts made.

The quality of instruction was good overall. Three of the five instructors observed appeared to be engaged in "reciprocal learning" with the learners and displayed a caring attitude and willingness to assist learners achieve their goals. Evidence varied from instructor to instructor, but an ability to demonstrate the thinking processes necessary for basic skills to be taught effectively was evidenced in most instructional delivery.

Project management, selection and recruitment of participants, and so on, were well administered and appeared to be effective. Numbers of program completers were exceptionally high (80%). These are good indications that program advertisement and publicity accurately reflected content, that instructional sessions were scheduled for convenient times and location, and that participants' goals were being met satisfactorily.

Product- The impact of the program was assessed with a combination of indicators, including comments from learners and instructors, comparisons of pre- and post-test scores, and exit interview responses from key personnel representing both the education and business partners. A summary of the results follows.

Business and industry organizations normally evaluate training on four levels. Because workplace literacy programs are directly related to assisting workers and trainees attain career goals by meeting job requirements and improving performance on job tasks, it is appropriate to measure program outcomes using this yardstick:

Level I- does the proposed program match with an identified organizational need? In this case, the project programs were desired by the partnering organization, ABC, to enable their trainees to master and complete craft training courses and function better at work through improved workplace applications basic skills. The grant application shows that specific job tasks and special needs of each critical craft training were identified and targeted. The job training tasks and requirements were carefully selected and analyzed through literacy task analyses, from which the curriculum was then developed.

Level II- do the participants selected for training master the content of the training program? Impressive gains from pre-/posttest scores, instructor anecdotal reports, and post-program statements by participants compared to pre-program goal statements, provide strong evidence that participants mastered the content of programs for which this data was collected.

Level III- do those participants who master training demonstrate improved job performance in areas identified as critical to show positive transfer of learning? Program anecdotal reports and comments elicited from ABC craft course trainers and directors indicated that significant changes in trainee performance were noted. Of those who cited improvements,

they were able to identify specific observable, measurable behaviors that clearly demonstrated positive transfer of course content to job and training tasks.

Level IV - does impact on performance lead to demonstrable cost benefits, i.e., money saved or generated, by the positive changes in employee behavior? In this case, ABC Training Center and their member-affiliate companies did not report indications of positive program impact via individual behavioral indicators, performance appraisals, or supervisor ratings; nor did they cross-reference these with instructional objectives of the program. No data exists, therefore, for determining the possible cost-benefits derived from trainee or employee participation in the programs. The data collected as evidence of higher retention rates of participating trainees and of additional enrollees in the Center due to the workplace literacy component of training are positive indicators of benefits derived from the program. I

When programs are underwritten by federal funding, it is viewed in a positive way to apply such monies to value-added training for an organization's workers, or in this case, trainees. When an organization does not elect to invest in continued human resource development, (i.e., the program), at this level of commitment beyond the funded period, it indicates that such training has not become an organizational priority. In discussions held by the evaluator with representatives from ABC at the conclusion of the project, the decisions to institutionalize and replicate the demonstration project had already been made. This is strong evidence that the program is viewed as one that adds value to the ABC organization.

Conclusions and Recommendations

Based on the results of this evaluation, the following conclusions and recommendations concerning stated grant goals are offered.

There is strong evidence showing:

1.) that the basic skill levels of construction workers and craft trainees have been upgraded in order to increase their job security, productivity and potential for career advancement, through

- provision of a technical development lab that is accessible, non-intimidating, and positive, as measured by enrollment and attendance rates;

- provision of a basic skills program, in which 75% of completers achieve 80% mastery, as measured by job task-based competency tests developed by the project planning team);

- provision of a GED program, in which participants demonstrate for every 50 hours of instruction a minimum of 1 year gain in math or reading on a standardized test ;

- placement of 100-150 participants in individualized, self-paced courses of study that include opportunities for interaction with peer/tutors or group activities in problem-solving and workplace socialization, as measured by completed participant and immediate supervisor questionnaires; and,

- provision of basic math, writing, and reading skills that enhance participant achievement in ABC classroom craft-related training, demonstrated by passing grades.

2.) development and use of record-keeping and documentation systems, including collection, interpretation and reporting of data on

program development and implementation activities and on individual progress of participants;

3.) successful program implementation through the use of appropriate processes for participant recruitment and selection, class scheduling, development of individual education plans, curriculum delivery, pre- and post-assessment, and instructor training and support, that are academically and organizationally sound and that match with program goals;

4.) increased retention rates among employee/trainee participants, especially those in the first four years of construction trade employment, through

- hiring of project personnel experienced in counseling and in development of individual learning plans;

- provision of individual attention and counseling for participants in order to enhance their self-worth and self-competency, as measured by positive responses on attitudinal tests at the end of the program;

- provision of program instructional component addressing workplace social skills, or workplace culture, available to all program participants;

- provision of basic skills remediation component to support ABC training program classroom craft courses success, based on analysis of classroom tasks;

- collection of retention rates from a sampling of local firms for ABC program participants and non-participants to determine whether differences in rates exist;

- improvement upon 44% drop-out rate in ABC craft training program by end of funding period.

There is a moderate amount of evidence indicating:

1.) that basic skills curricula that coordinates instruction with the needs of the total workplace environment of the Baton Rouge industrial contractors has been developed through

- assembly of a comprehensive project planning team with collective background experiences in curriculum development, adult basic education, vocational education, construction training, human relations, counseling, and development of individual learning plans;

- use of a workplace literacy advisor for consultation on program design; and,

- incorporation of employee/trainee participants' input into program design, implementation and evaluation.

Recommendations:

1. Literacy task analyses were conducted to create the customized portion of the curriculum, basing instruction on those support skills needed for mastery of craft training courses and petro-chemical industrial maintenance job tasks. No evidence yet exists to demonstrate that mastering these skills results in improved performance of the targeted tasks; in other words, other than a few anecdotal records there is little data to support the transfer of learning to job or training task performance. There is also no data available from ABC member affiliate companies to verify the priority of those craft skills targeted for basic skills support training. Identifying performance indicators with craft instructors and with affiliate member companies would enable base-line and post program cycle data collection of this information.

2. Trainees participating in the program were surveyed for reactions to their instructional experiences in general, but no data was elicited to provide specific input for revisions to program design or implementation activities. Creating opportunities and vehicles for instructional materials review by participants, perhaps through focus groups or third party interviewers, would enable collection of specific participant suggestions for changes in curriculum design or implementation procedures.

There is little or no evidence showing:

- a smooth instructional flow of activities within the curriculum, reflecting a sound developmental approach to mastering those literacy skills necessary for competent performance of identified job tasks through

  - use of a minimum of 30% customized instructional materials, developed from the results of specific job task analysis;

  - involvement of participants' supervisors in program by encouraging feedback to participants and project planning team;

  - interaction with human resource personnel of large area firms to develop attitudinal test and to track results for a two-year period; or

  - reporting program progress to managers every three months

Recommendations:

1. Conduct more rigorous and comprehensive preservice trainings with instructors to ensure that the properly incorporate and deliver the customized curriculum into instruction. Use of scripted instructor guidelines can also provide on-going support for appropriate use and understanding of materials beyond preservice and inservice sessions.

2. Provide additional data demonstrating that reports to managers and involvement with participants' supervisors to obtain feedback occurred; or, if close location and frequent informal communication between key project and ABC staff occur on a regular basis, eliminate the reports as required indicators of program success.

3. Rethink the task of developing a local attitudinal test; validation of items and the instrument as a whole is a strenuous and time consuming task, involving the developers and the companies that serve as pilot populations. Given the already stretched schedules of program staff, you may want to investigate professionally developed instruments for measuring attitude that are available commercially, then work to tie those to your program.

ORIGINAL GRANT

ABSTRACT

PROPOSAL ABSTRACT: ABC'S OF CONSTRUCTION

The ABC's of Construction Project will offer basic reading, math, communication, and workplace skills to 100 to 150 industrial construction workers. A Technical Development Lab will be set up at the Training Center of the Associated Builders and Contractors, where a multi-million dollar private craft training program is currently being implemented to meet critical construction needs in the local petrochemical facilities as those plants try to keep up with international demands.

Three groups of workers are especially targeted for skills upgrading: a) those involved in the 4-year entry level mechanic's training program who are having trouble with basic skills needed for success in the classroom; b) those unskilled laborers who work for member companies but who cannot enter into the training program because basic skills are below a 6th grade level; and c) young, entry level workers with little previous work experience.

The partnership is made up of the Adult and Continuing Education Department of East Baton Rouge Schools and the GREater Baton Rouge Chamber of Commerce. All basic skills instruction will occur at the site of the Training Center of the Associated Builders and Contractors, an organization of over 200 member industrial contractor firms. The Adult Education Department, as the grantee, will be accountable for the budget and the design and implementation of the instructional program, including complete job-task analyses and the development of a functional contextual curriculum.

Child care reimbursement and educational counseling will be available for participants. Individual learning plans that correlate student goals to suitable curriculum strands will be formulated by the student and the project coordinator with regular updates.

A curriculum strand of basic skills will be developed for each of eight areas of industrial construction, such as pipe fitting, welding, etc. A GED program will be offered, as will a strand that teaches work habits and the social skills of the workplace. A basic skills program for low-skilled workers will bring reading and math up to the levels required for entry into the Training Center course work.

With the highest adult illiteracy rate and one of the highest school dropout rates in the nation, Louisiana needs the impetus of this public/private partnership to serve as a model for workplace literacy projects on a large scale.

CLASSROOM ENVIRONMENT INVENTORY

CLASSROOM ENVIRONMENT INVENTORY

Directions: The purpose of this questionnaire is to find out your opinions about the **TECHNICAL DEVELOPMENT CENTER** lab you are attending right now. The questionnaire asks your opinion about what this lab is really like. Show your opinion about each question by indicating if you STRONGLY AGREE (SA), AGREE (A), DISAGREE (D), or STRONGLY DISAGREE (SD) that the statement describes what this lab is really like.

_____ 1. The instructors consider my feelings.

_____ 2. The instructors assign lessons rather than show me how to work lessons.

_____ 3. I look forward to coming to the TECHNICAL DEVELOPMENT CENTER.

_____ 4. I know exactly what I have to do in the TECHNICAL DEVELOPMENT CENTER.

_____ 5. My co-workers approve of my attending the TECHNICAL DEVELOPMENT CENTER.

_____ 6. All students in the lab are expected to do the same work, in the same way and in the same time.

_____ 7. The instructors talk individually with students.

_____ 8. The instructors respect my privacy.

_____ 9. I put effort into what I do in the TECHNICAL DEVELOPMENT CENTER.

_____ 10. I am dissatisfied with what I do in the TECHNICAL DEVELOPMENT CENTER.

_____ 11. Getting a certain amount of work done is important in this lab.

_____ 12. I am dissatisfied with what the instructors do in the TECHNICAL DEVELOPMENT CENTER.

_____ 13. New and different ways of teaching are seldom used in this lab.

_____ 14. I am generally allowed to work at my own pace.

_____ 15. The instructors go out of their way to help students.

_____ 16. Working in the TECHNICAL DEVELOPMENT CENTER, I have a sense of satisfaction.

_____ 17. The TECHNICAL DEVELOPMENT CENTER is a good place to learn.

_____ 18. I am dissatisfied with what I do in the TECHNICAL DEVELOPMENT CENTER.

_____ 19. I have a say in how I use my lab time.

_____ 20. The instructor helps me when I have trouble with the work.

_____ 21. The lab is a waste of time.

_____ 22. Lab instructors volunteer their help--I do not always have to ask.

_____ 23. This is a disorganized lab.

_____ 24. Teaching materials in this lab are varied, new, and interesting.

_____ 25. The instructors seldom move around the classroom to talk with students.

_____ 26. This lab is boring.

_____ 27. Lab assignments are clear so everybody knows what to do.

_____ 28. Instructors allow me to move at my own pace.

_____ 29. Lab instructors aren't interested in my learning.

_____ 30. I enjoy coming to this lab.

_____ 31. Lab instructors aren't interested in my personal problems.

_____ 32. There is little opportunity in the TECHNICAL DEVELOPMENT CENTER for me to pursue my interests in my field of work.

_____ 33. The instructors are unfriendly and inconsiderate towards students.

_____ 34. Instructors dominate my talks with them.

_____ 35. There is no connection between what I do in the TECHNICAL DEVELOPMENT CENTER and what I do (or want to do) at work.

_____ 36. The lab materials are boring.

_____ 37. The TECHNICAL DEVELOPMENT CENTER is too noisy.

_____ 38. The activities in the TECHNICAL DEVELOPMENT CENTER are clearly and carefully planned.

_____ 39. Lab instructors know me--my name, my work, my family.

_____ 40. Coming to lab is a positive experience.

LITERACY TASK ANALYSIS

REPORT: LITERACY ANALYSIS
A.B.C. TRAINING PROGRAM--BATON ROUGE, LOUISIANA

The purpose of this report is to communicate general information to education providers who wish to furnish basic skills support to workers in A.B.C. training programs in Louisiana. Each training program has its own unique character, however, and skill enhancement projects must be designed to suit the needs of the workers involved, the local curriculum, and the overall goals of the trainers.

The important variable that cannot be factored into this type of literacy audit is the teaching strategies of the craft instructors. For example, a worker who has a literacy level much below that of the training materials is still successful if the instructor "tells" him/her in class exactly what information is needed. The worker will learn the necessary information, not from reading any of the assigned training materials but, rather, from the verbal explanations in class. It is often more difficult for workers to make up math deficiencies in this way; therefore, the basic skills program in Baton Rouge (the Technical Development Center) devotes much more teaching contact hours to math instruction. Nonetheless, research in workplace literacy demonstrates that workers can reconcile basic skills deficiencies for as much as two grade levels, but not much more. In other words, if job materials are written on an eighth grade level and the worker is normally proficient only up to a sixth grade reading level, that worker can still comprehend the higher level material when it deals with a job and work task that he has become familiar with through work experience.

READING

Attached are readability studies performed on A.B.C. training materials using the Rayger Readability Estimate, one of several formulas that assigns a grade level figure to written text based on length of sentences and words. Using these scores along with the TABE tests for assessment is a logical strategy because the TABE assigns a grade level score for students as a part of the testing results. Included on the attached sheets are both the average score as well as the figures used to obtain the average so that educators may observe the "range" of readability of materials in each craft area. At ABC in Baton Rouge, the reading comprehension skills needed for success are basically the same in the first year of training as they are in the fourth year; however, the need for application and problem-solving skills needed for success escalates as students move through the coursework. The recommended MINIMUM skill level to help assure success in any facet of the ABC Training Program in Baton Rouge has been identified as 8th grade in math and reading comprehension. (Please refer to attached Rayger scales.)

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MATH COMPETENCIES

The ABC Training Center staff is still working with the teaching staff in the TDC to expand their knowledge of job-specific applications of trade math. We also realize that much of our work in the TDC is based on a "vision" of what could be required of our workers further "down the road" in their jobs.

A literacy task analysis has demonstrated the necessity among most workers for strong basic math skills. Attached to this report are examples of math tasks that our students have had to deal with in class. The following information is offered to assist in further defining the task at hand:

* all workers involved in different training courses must know the basic operations with <u>whole numbers</u>, whether calculating how much paint is needed, amount of pay for hours worked, or the outside area of a small tank that must be insulated.

* in addition, workers in nearly every craft area will have to <u>read charts and tables,</u> as well as understand how to read the <u>diagrams</u> that appear often as part of the explanations in the teaching materials.

* we also conclude that for all students who need algebra and/or trigonometry, the use of a <u>calculator</u> should be considered a basic skill. There are a number of adult materials published that can teach this in an individualized, self-paced manner.

* <u>measurement</u> skills are needed in every trade (reading tapes, dials, meters, and calipers).

* problem-solving and critical thinking skills continue to increase in importance and, perhaps, need the most practice.

* <u>percent</u>, such as percent overload for circuits, percent of pay going to benefits, percent waste provided for in ordering or using materials, etc.

EVALUATION OF ENTRY-LEVEL MECHANICS COURSES AT A.B.C. IN BATON ROUGE REVEALS THE FOLLOWING REGARDING SPECIFIC MATH REQUIREMENTS:

All ELM students need strong basic math skills. Mastery of the four basic operations with whole numbers, decimals, and fractions are necessary. Most students will be required to be adept at reading and applying information from a chart or table, as well.

<u>Electrical and Instrumentation:</u>

E & I requires some of the highest reading and math skills. Not only do successful workers in this craft area need all the math skills heretofore mentioned, but training materials also demonstrate a need for some specific geometry, algebra and trig

skills. It is very important for these students to know how to plug numbers into a formula and the find the solution.

Examples of problems requiring trig are:
trig for bending pipe and conduit; trig for dealing with alternating current (i.e., tan ∠ = opposite side/adjacent side; or "In an impedance triangle in the figure, find the impedance Z if R=15 and angle A= 50°.)

The types of algebra involved are usually limited to solving for a third or fourth quantity if others are known, such as

$$\frac{V_x}{V_t} = \frac{R_x}{R_t} \quad \text{or} \quad \frac{2R}{3} - 4 = 6$$

Also, there are some instructors who ask students to solve simultaneous equations:

$$3x + y = 6$$
$$y = 2x + 1$$

Pipefitting:

The emphasis in pipefitting is on fractions, even to 32nds of an inch; ease with measurement; some geometry (especially triangle geometry such as Pythagorean problems with square root) and related trig (sine, cosine, tangent problems). The trig applications will usually be taught in the craft classes.

Millwright:

The emphasis for millwrights is mastery of basic math--those concepts usually taught by the end of middle school. Also needed is great agility with decimals--rounding off to 6 decimal places, for example. Practical applications of basic math, such as finding amount of concrete, total weights, etc., are called for. There is much demand in this trade area for reading fine calipers and measurement devices.

FREQUENCY COUNT OF READING TASKS IN FIRST SEMESTER CURRICULUM
FOR MILLWRIGHTS, PIPEFITTERS, AND ELECTRICIANS (E. & I)

SUMMARY

SUBJECT	SYMBOLS/ ABBREV.	TECHNICAL VOCAB	SPECIAL/ FIGS	CONTEXT	GOALS/ OBJS	READINGS/ SUBS	PARTS OF BOOKS
E & I	615.00	955.00	416.00	1039.00	13.00	39.00	63.00
PIPE	45.00	214.00	213.00	330.00	56.00	10.00	0.00
MILL	181.00	345.00	332.00	182.00	55.00	27.00	1.00
TOTALS	841.00	1514.00	961.00	1551.00	124.00	76.00	64.00

SUBJECT	CROSS-REFS	READING TABLES	READING DIAGRAMS	SEQUENCES	CAUSE-EFFECT	COMPARE/ CONTRAST
E & I	290.00	204.00	644.00	58.00	133.00	397.00
PIPE	2.00	11.00	144.00	25.00	2.00	36.00
MILL	1.00	8.00	386.00	45.00	20.00	60.00
TOTALS	293.00	223.00	1174.00	128.00	155.00	493.00

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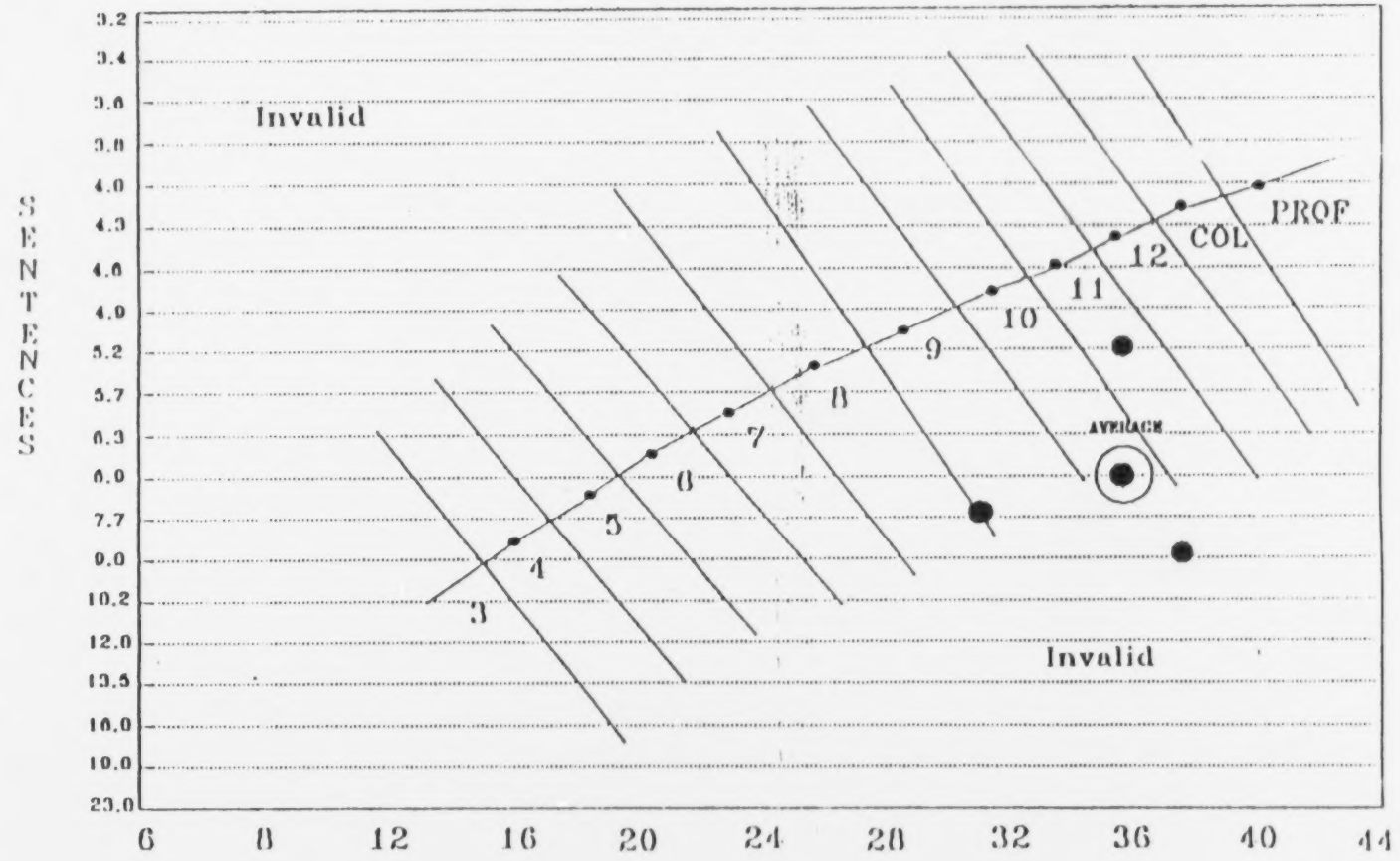
THE RAYGOR READABILITY ESTIMATE

Alton L. Raygor—University of Minnesota

1. Count out three 100-word passages at the beginning, middle, and end of a textbook selection. Count proper nouns but not numbers.
2. Count the number of sentences in each 100-word passage, estimating to the nearest tenth for partial sentences.
3. Count the number of words with more than five letters.
4. Average the sentence length and word length measures over the three samples and plot the average on the graph. The grade level nearest the spot marked is the best estimate of the difficulty of the selection.

THE RAYGOR READABILITY ESTIMATE

ALTON L. RAYOR – UNIVERSITY OF MINNESOTA



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THE RAYGOR READABILITY ESTIMATE

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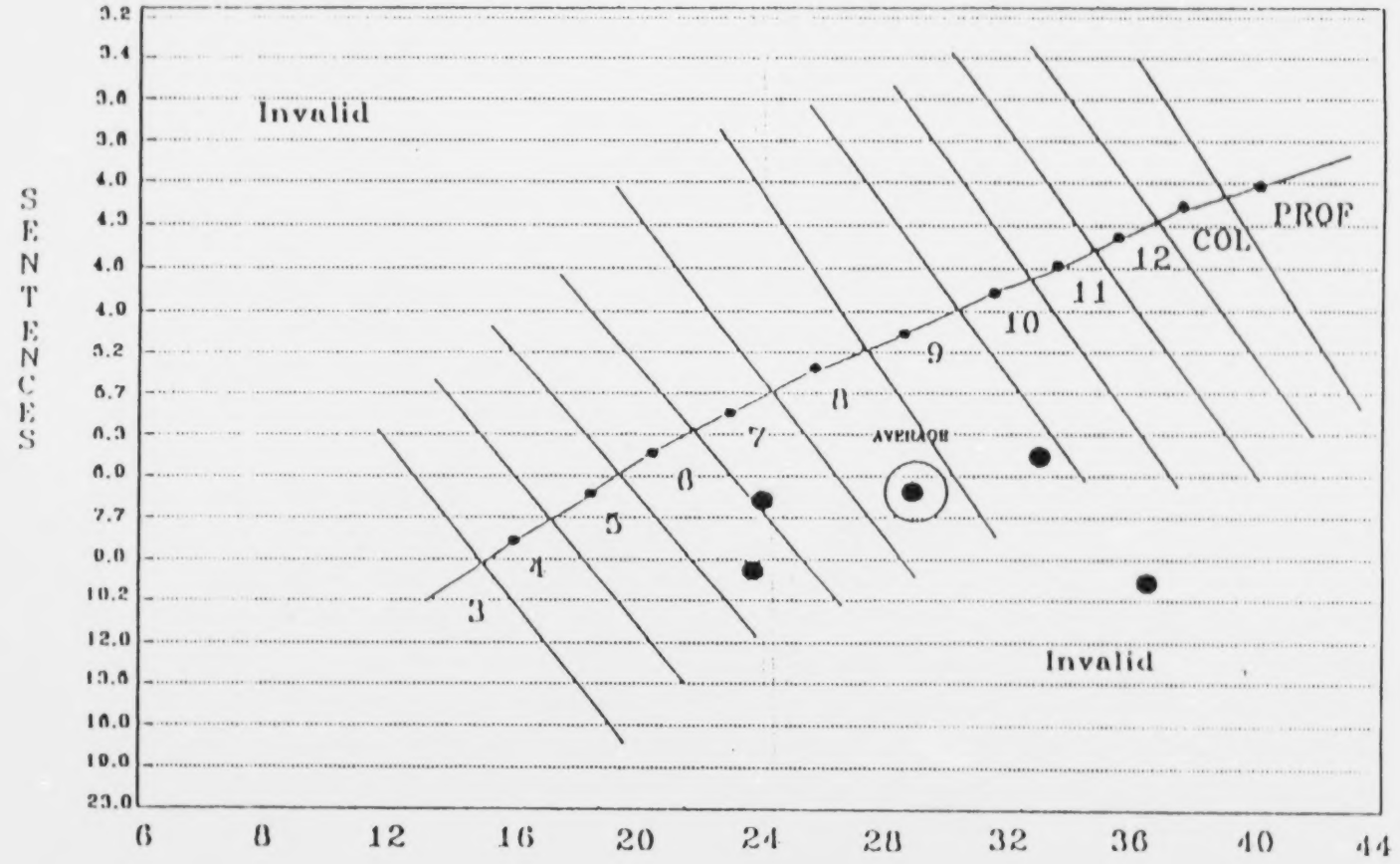

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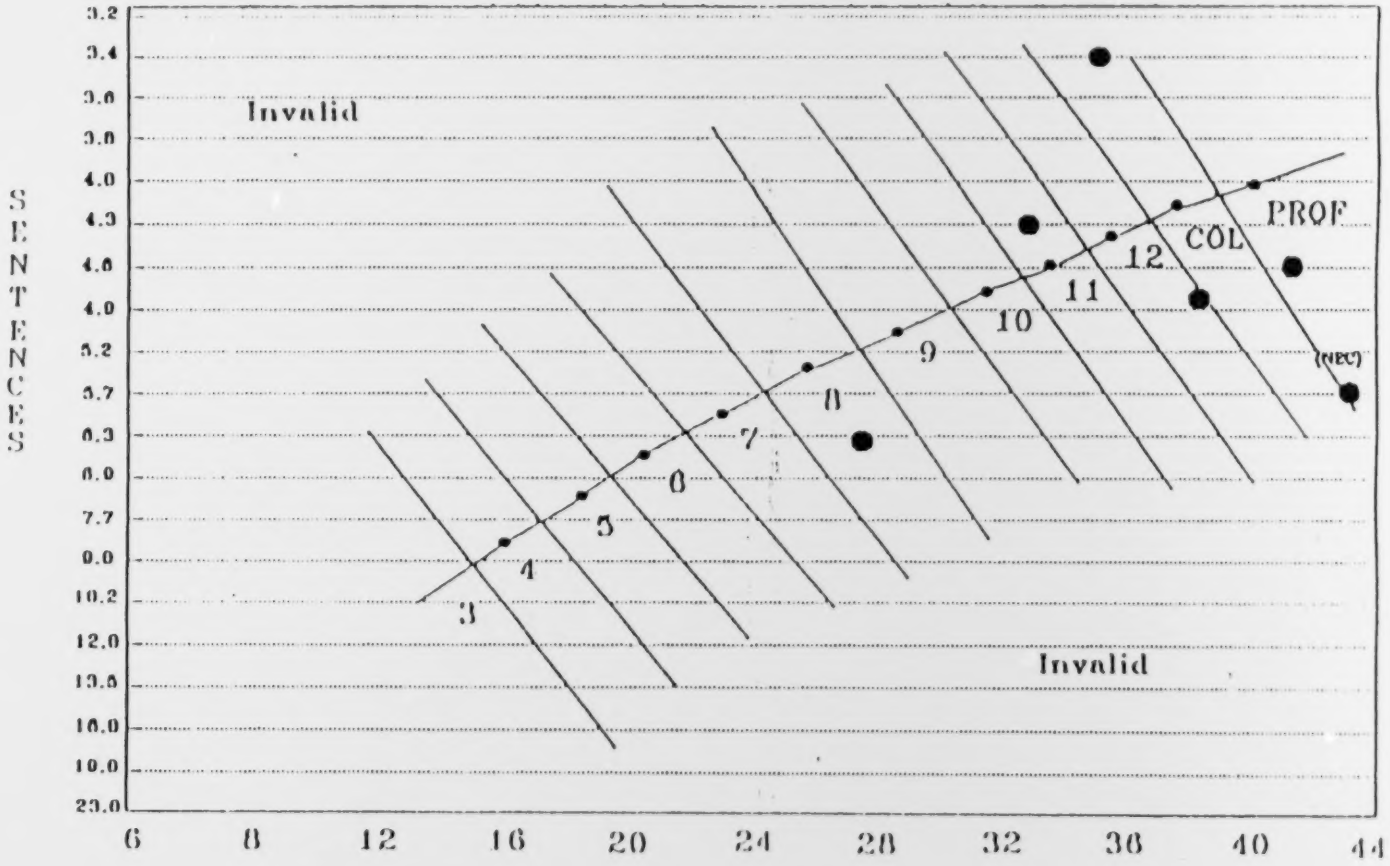

ELECTRICAL INSTRUMENTATION LONG WORDS

THE RAYGOR READABILITY ESTIMATE

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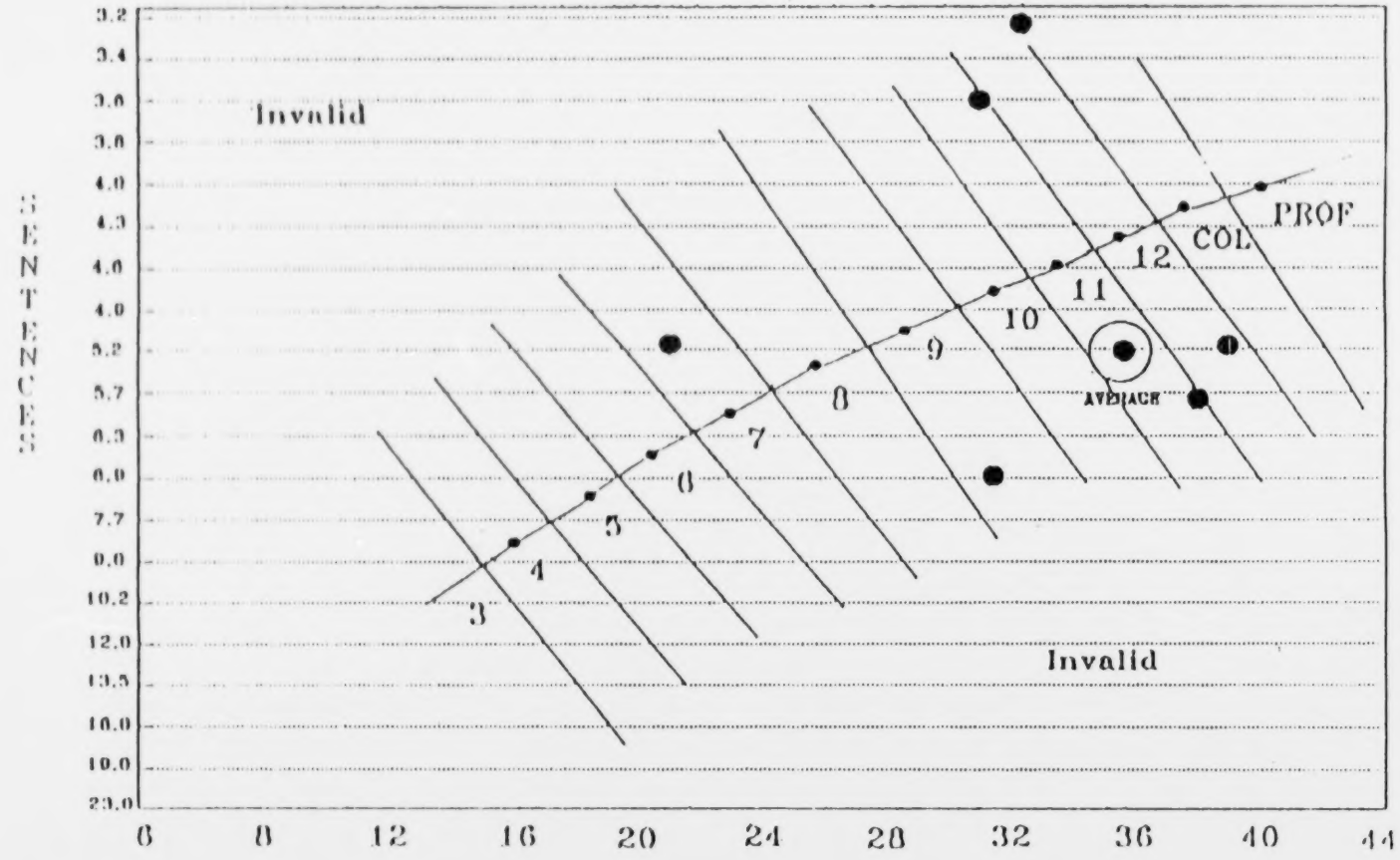

RIGGING

THE RAYGOR READABILITY ESTIMATE

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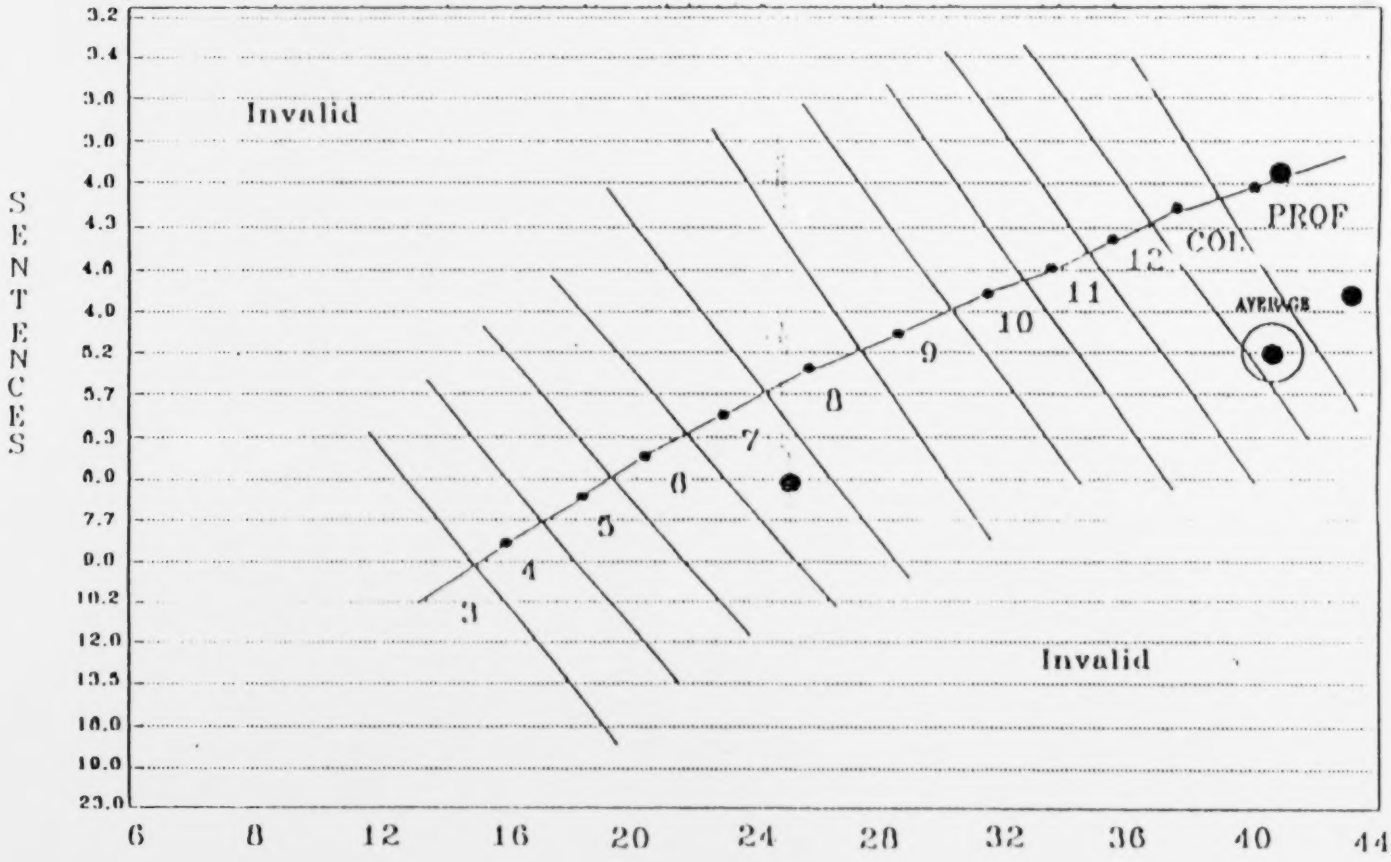

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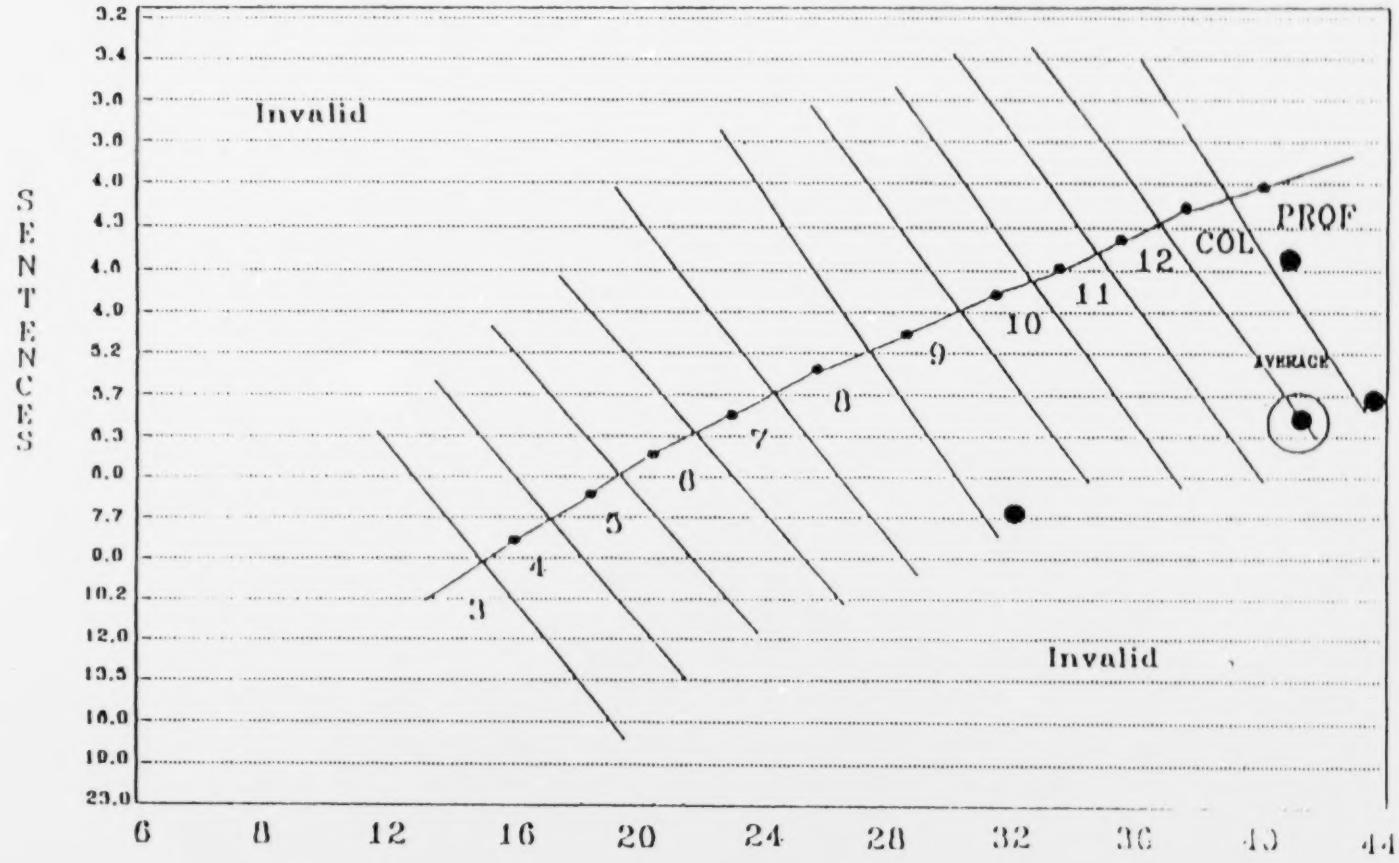

WELDING

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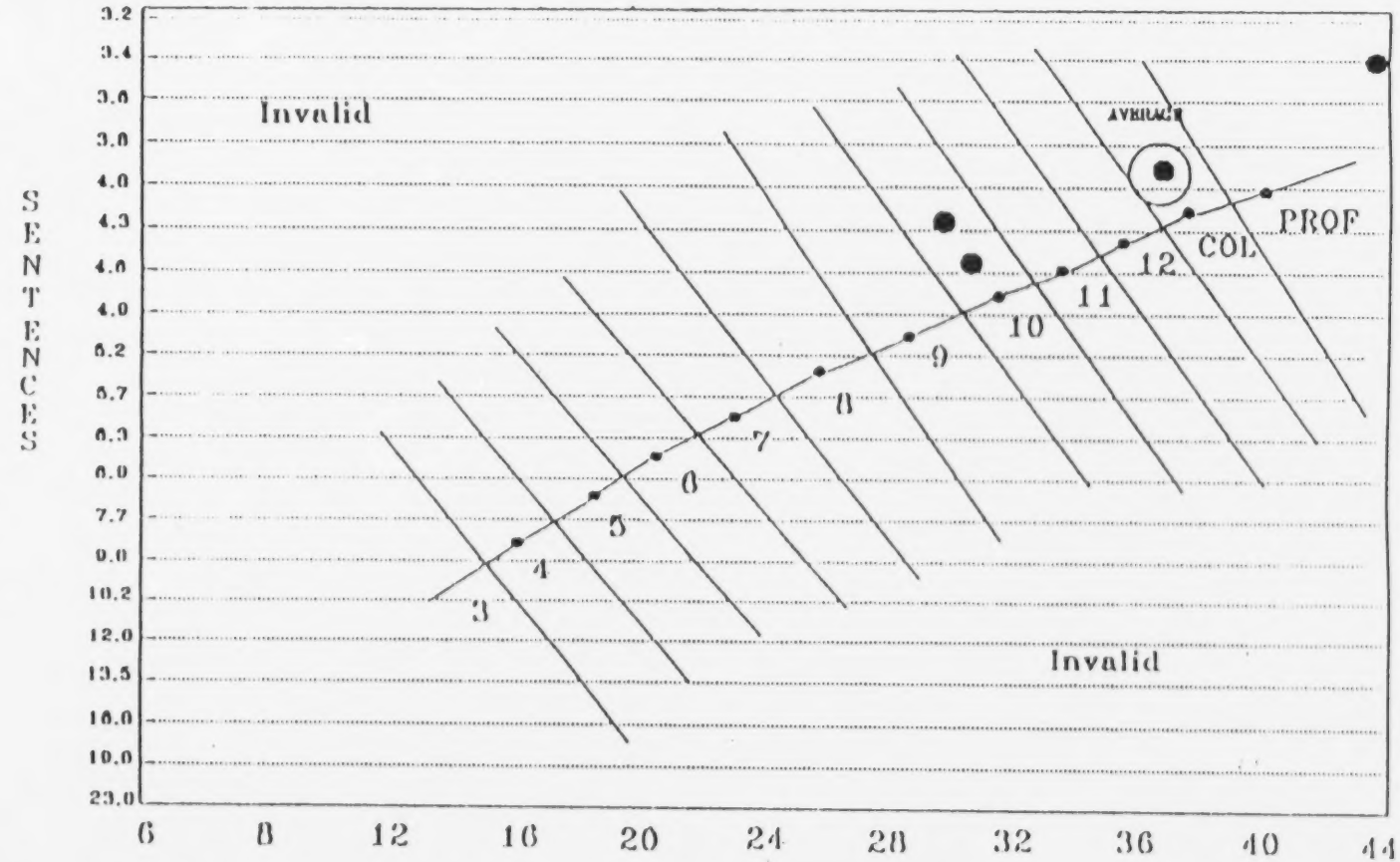

HVAC III

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THE RAYGOR READABILITY ESTIMATE

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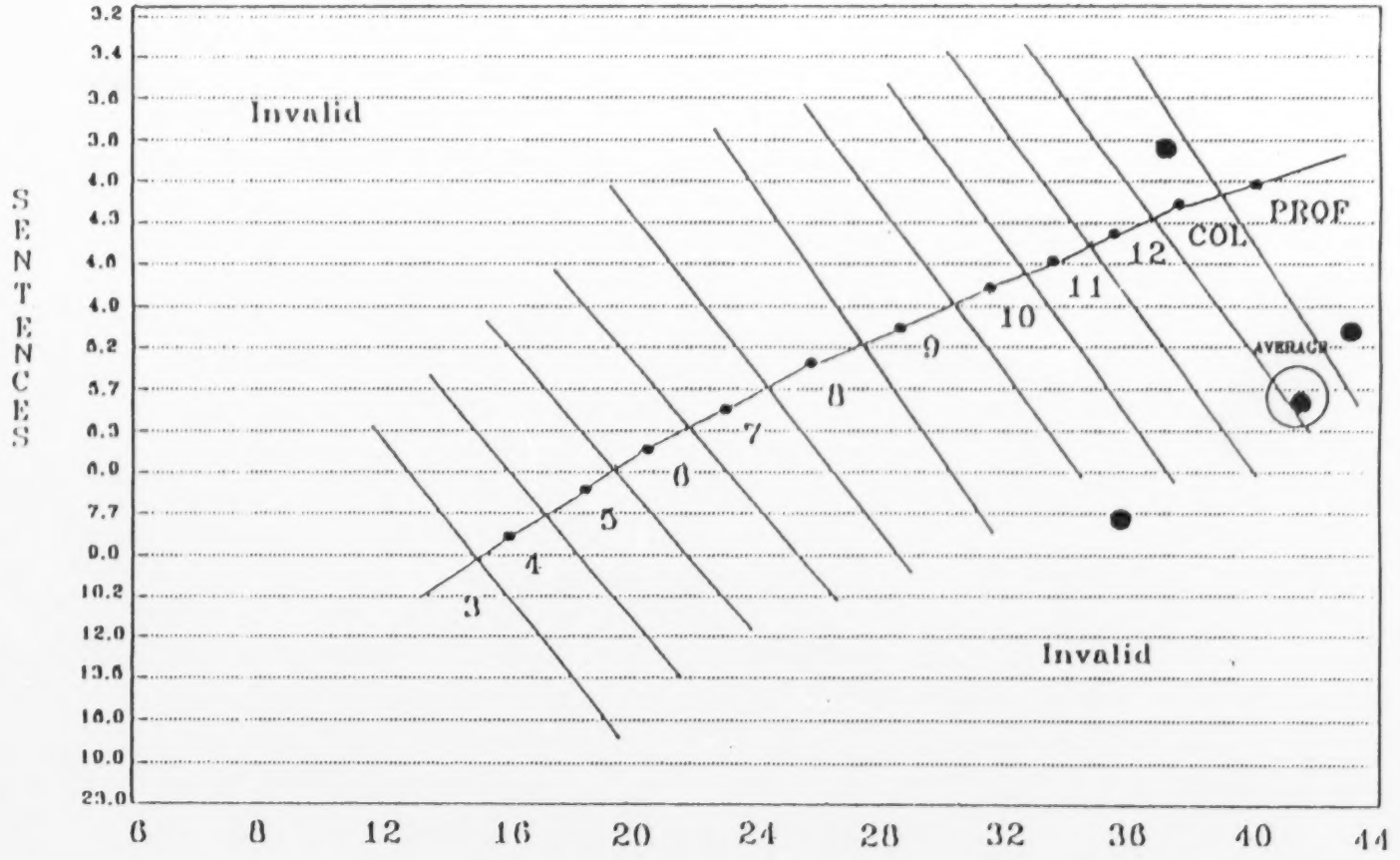

SHEETMETAL

Basic Skills

for

Welding

Submitted by

Dr. Doreen Maxcy

March 27, 1991

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Basic Skills for Welding

An analysis of the basic skills necessary to read the module, "Weld Process Techniques" developed by Mr. Booth, a welding instructor at ABC, revealed the following types of skills were needed and their frequency:

Skill	SMAW	GTAW	GMAW
I. Main Idea			
A. Sequencing	5	5	5
B. Application	Thruout	Thruout	Thruout
C. Cause/Effect	14	3	3
D. Compare/Contrast	14	2	5
E. Critical Thinking	8	Thruout	Thruout
II. Vocabulary			
A. Technical Vocabulary	18	15	9
B. Figurative Language	6	7	2
C. Abbreviations/Formulas	2	5	12
D. Context	Thruout	Thruout	Thruout
III. Study Strategy			
A. Goal setting/Objectives			
B. Ordinate/Subordinate			
C. Cross Reference/Synthesis	Thruout	Thruout	Thruout
D. Table of Contents			
IV. Math			
A. Decimals (0.005)		2	5
B. Fractions (1/32)	3	11	7
C. Angles (5°)	11	9	6
D. Inches (1/32)	3	6	6
E. Percents (5%)		3	17
F. Reading Clock (4:30)		3	
G. Formula (CO_2)			9
V. Reading Documents			
A. Diagrams	13	21	17
B. Tables			2
VI. Soft Skills			
A. Interpersonal Relations			
B. Dealing with Authority			
C. Appearance			
D. Writing Skills			
VII. Visualizing	Thruout	Thruout	Thruout

Welding Curriculum

My Perception

Present Instructional Procedure	Demonstration
Entry Procedure	No aptitude test
Progression of skills	Instructor determines
Testing/Certification	Left to employers, not at ABC Training Center

ABC Administration's Perception

Feels the facility is good and the instructors are good. Wonder if they are approaching learning in the best way. Have met a representative of the American Welding Society concerning the possibility of becoming a certified training site. Presently the AWS only certifies welders on plate and not pipe (both are needed in our area). Several problems need to be worked out but this is the direction they are headed.

Instructors' Perception

The instructors like the facility and feel they are doing a good job. All instruction is taught one-on-one. They do not incorporate group lessons or lectures, and have no written material, visuals, etc. to support what they tell or demonstrate to an individual. This method of instruction is how they were taught. I believe they want the students to succeed; however, they have never been exposed to an alternative delivery system nor educated in the use of supplementary materials.

Students' Perception (control is determined by instructors & owners)

Present Instructional Procedure	Demonstration
Entry Procedure	Who you know
Progression of skills	Personal skills & how well the instructors like you
Testing, certification	Left to employer

When asked how could the instruction be improved the students interviewed were anxious to talk. The students were very vocal along two avenues:

I. They felt they were supposed to have a lot of background information and they did not. Examples include:
   a. Orientation to welding and the ABC Training Center

b. Welding terms
c. Knowledge of welding materials, tools, procedures
d. Safety background
e. Math background
    1. Angles, degrees
    2. Volume background to understand the thickness of rods
f. Metallurgy
    1. Difference between rods (between properties of metal)
    2. Temperature ranges for metals

Other basic skills dependent on reading or math were not discussed because of the present method of instruction.

II. Method of instruction

Everything is strictly demonstration. Nothing is written nor are there any visuals, such as diagrams, charts, (except a few on the walls) to aid with the learning process. The only way to learn is if the instructor personally explains things to you. The students would prefer to have more control over the learning process and not be so teacher dependent.

Something I would like the Training Center Staff to consider would be their guidelines to access to the welding booths. Now, students may come two times a week. This rule is frustrating for those who really want to progress for they would like to come four times a week. The teachers' dictate, "We know best for you." Why couldn't a motivated student be allowed to come more often and "fill in" at a welding booth if someone doesn't come to class? Students mentioned to me there's always empty booths but they still won't let you come more than twice a week. This slows and discourages the motivated students. Maybe have a rule that if the student who is assigned to a booth doesn't show by 6:30pm (class starts at 6:00pm), another student may work in that space with the permission of the instructor. If no booth is available, the student could work in the "Learning Center". When I mentioned the "Learning Center" might utilize computers as a part of the educational process, the students thought that was great. They had not worked on computers before but they wanted to learn.

<u>Owners' Perception</u>

The ABC owners and their personnel departments are pleased with the students' progress because the welding program requires the students to start with the basic "plate" welding and progress upward in the skill levels. When asked about their "soft skills" such as completing an application, they felt the students could do an adequate job. As one personnel director indicated, "I'm not hiring someone to look good or fill out a form but rather to weld." The only suggestion I was able to obtain was that it would be nice if the welders had some basic knowledge of pipefitting (distance, elevations) in order to assist the pipefitters with whom they work.

Ways to Improve the Welding Curriculum

1. Introduce multiple approaches to learning (tactual, auditory, verbal) then reinforce learning with more videos, demonstrations, written work, diagrams, study guides, quizzes, and group discussion.

2. Develop an entry exam that would test for
   a. Fine motor skills (draw row of circles holding the eraser end of the pencil)
   b. Gross motor skills (strength)
   c. Visual depth perception
   d. Concern with danger (sparks)
   e. Concentration (can he/she deal with the intensity of the work)
   f. Hand/eye coordination

3. Develop a training program that will take the welder through the welding inspector level and let all students and instructors be informed about it. Provide higher levels of training that inform students about metallurgy. Change the perspective of welding to be that of an art (the instructors and students secretly believe it is but the rest of the craft areas don't view it that way.)

4. Identify what the basic skills are within the discipline of welding at each of the respective levels. These skill levels should be clearly delineated for the students such that he can receive recognition for each of his incremental improvements. Now, you can either weld plate or not weld plate, there is no differentiation within this level of skill.
   I would hope the entire progression of skill levels (all the way through the inspector level) could be offered at the ABC site and tied into the American Welding Society's standards.

5. Incorporate written materials into the curriculum. I have attached a brief bibliography of materials I would suggest.

Safety Words on Signs

A
above
area
asbestos
and
authorized
are
ammonia
acid
arc
alarm
ahead
aisles
at
all
acute
authorization
avoid
always
add
acid
aluminum
available
aid
areas
admittance
a
accident
accidents
away
automatic
acids
apparatus
avoid
agent
after
awful
ambulance
automatically

B
by
beyond
benzene
buried
battery
below
badge
be
biological
breathing
building
before
begins
beam
breathe
blanket
biohazard

C
confirmed
construction
clearance
chlorine
cancer
clothing
clear
caustic
cable
conveyer
charging
closed
chipping
contact
carcinogens
cause
chemical
chemicals
clean
care
cans
cylinders
chained
chock
cyanide

contact
creates
corrosive
clear
chained
contamination
caution

D
danger
disease
drinking
do
devices
door
designated
down
dry
data
drink
dept.
days
device
during
disconnect
directions
don't
dial

E
enter
eye
equipment
eating
explosives
electrical
eat
excavate
ear
extended
exposure
entering
employee
entrance
empty

emergency
except
eyes
extinguisher
entry
electrical
enter
even
elevator
exit
eyewash

F
flames
flammable
formaldehyde
forklift
fiber
fire
film
foot
for
floors
full
first
food
from
flame
fork
floor
fragile
facility

G
gasoline
guards
grounding
gas
gloves
goggles
grinding
glasses
guards

H
hazard
hydrogen
hazardous
high
hot
hands
hearing
hard
hat
hazards
handle
here
has
highly
horn
hose
handicapped

I
in
irritant
infectious
ice
is
injuries
inhalation
injury
instructions
info

J

K
keep

L
low
locked
lung
liquids
laser

loose
line
laboratory
lenses
loss
light
lane
lost
loading
lockout
lift
lungs
label
littering

M
men
matches
moving
machine
material
must
may
mandatory
mouth
mercury
maintenance
microwave
medical

N
no
not
noise
notice
number
needles
new
numbers

O
only
out

off
or
open
oxygen
operating
of
operate
optic
overhead
occur
office
ok
on
other
once

P
permit
personnel
protection
point
protection
pinch
pesticide
poison
pin
points
protect
potential
propane
proper
protected
place
power
pressure
positively
police
please
prosecuted
permitted
pregnant
prevent
pipet
people
pitch

phone
pipeline
prohibited
present
pressure
promptly
persons
pesticides
provided

Q
quiet

R
required
respirators
restricted
respirator
required
route
radiation
reproductive
receptacle
request
room
register
receiving
returning
report
remove
respirator
response
read

S
space
starts
smoking
step
storage
sulfuric
security
static
safety

strictly
select
substances
slowly
skin
should
slippery
stored
sheets
shipping
shower
side
smoke
servicing
squeeze
surface
spill
station
start
shoes
solution
storage
slowly
spills
should
suspect
store
safe
sound
stealing
stairways
stop
site

I
this
trespassing
traffic
times
toxicity
training
to
toxic
thank
time

turn
trigger
touch
the
trained
trespassers
think
telephone

U
unauthorized
use
underground
ultraviolet
upon
unloading
using
up
unsafe

V
voltage
vapors
visitors

W
working
watch
welder
without
warning
waste
water
wear
when
worn
work
working
with
wet
wash
worked
wheels

wear
weicing
women
will

X
x-ray

Y
your
you

Z
-

OVERVIEW OF CURRICULUM
AND ORIGINAL INSTRUCTIONAL MATERIALS

ABC'S OF CONSTRUCTION

Overview of Curriculum and Modules of Instruction

Both original and commercially available instruction is used in the ABC's of Construction Program. A diverse approach addresses different learning styles and a variety of student needs. Some computer-aided instruction is part of every student's Individual Learning Plan (ILP) in order to develop some comfort with technology. In industrial construction, most transfer of information is verbal and/or visual, so instruction incorporates the use of language masters, video, and tape recorders in order to simulate work and training tasks while learning.

For example, if a worker reads below the sixth grade level, he would be enrolled in the Level III Reading strand of instruction. His/her prescriptive plan would integrate original vocabulary exercises, using language masters, that teach safety terms and the words on plant signs. He/She would use Steck/Vaughn's Reading for Today series while working with a volunteer tutor or the video program from the Texas Scottish Rite Hospital Literacy Program. The same safety words he/she learns to pronounce and recognize from work on the language master would be taught and re-enforced using the "Word Master" computer program from Davidson (which allows customized word lists). In addition, original workbooks utilize an audio tape and worksheets to teach categories of safety signs. As the worker progresses, he will be assigned exercises with "Speed Reader" (to develop the correct eye movement and speed) and reading modules available in CSR's Integrated Learning System (CTB/McGraw-Hill), both computer-aided instruction.

Fractions are important in several craft areas in construction. Workers who need instruction in fractions may work with an audio tape/worksheet module "Fractions as a Tool," available from Educational Activities, and/or with the relevant modules contained in the Integrated Learning System computer program. We have developed original materials using a manipulative ("The Construction Inch") to teach equivalent fractions and, also, two measuring modules (actual pieces of construction materials that have to be measured in fractions of an inch.) Included in this strand of instruction are modules of original exercises called "Problem Solving with Charts and Tables" in which students must look up information on a table and then solve math problems with this information.

These are examples of how instruction is integrated and designed for each worker's learning needs, styles, and preferences.

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Original Material Developed:

Software:

Voltage, Current, and Resistance: Solving Formula Problems
Geometry for Construction Workers
Equivalent Fractions and Decimals at Work

Text, correlated with tapes and manipulatives:

Reading Safety Signs
Reading Safety Words 1-5
Reading Hazardous Materials Labels 1-3
Words in Context for Millwrights
Words in Context for Electricians
Words in Context for Pipefitters
Locating Main Ideas, Millwrights
Locating Main Ideas, Electricians
Locating Main Ideas, Pipefitting
Reading Charts and Tables, an Introduction
Reading Charts and Tables for Pipefitting
Reading Charts and Tables for Millwrights
Reading Charts and Tables for E & I
Reading Diagrams for Electricians
Reading Diagrams for Pipefitters
Reading Diagrams for Millwrights
Solving Problems with Charts and Tables, Millwrights
Solving Problems with Charts and Tables, Pipefitters
Solving Problems with Charts and Tables, Electrical
Measuring in Construction, I
Measuring in Construction, II
Fractions for Pipefitters